RAILROAD GAZETTE

FRIDAY, MARCH 22, 1901.

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## Contributions

### Gravity Switching and Hump Yards.

Berlin, March 3, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

Permit me a word concerning the very interesting article on the procedure in remodeling freight yards which appeared on page 1 of your issue of Jan. 4. The method of switching by ass-back (dos d'âne—hump) is not only used in France, but also in Germany. It was first used in Germany long before it was introduced in France; also, gravity switching was first used in Germany, namely, as long ago as 1846, at Dresden, and since 1861 at Zwickau (*Organ für die Fortschritte des Eisenbahnwesens*, 1871, p. 60; 1874, p. 182). After a committee of the North German Railroad Association had studied and recommended this method it was applied at several places, first without ass-back practice, but then as this arrangement was found economical and adaptable to the situations it was introduced more and more widely. As far as I know, it was first applied at Speldorf near Duisburg, on the Rhine in 1876 (*Organ für die Fortschritte des Eisenbahnwesens*, 1884, p. 42; *Zeitschrift für Bauwesen*, 1888, p. 395).

At this time most of the larger freight and switching yards in Germany are arranged for switching by gravity and ass-back, some examples of which have been published in the *Centralblatt der Bauverwaltung*, 1896, p. 451.

BLUM,
*Geheimer Ober-Baurath.*

### The Outlook for the Railroad Employee.

Louisville, Ky., March 7, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

In a newspaper recently, I observed the following: "The railroad man has anything but a rosy future before him. He realizes how fully his destinies are controlled by the powers that pull the strings." I do not know to what character of railroad man this applied, but naturally in these days of amalgamation and consolidation there must arise the query, how will this affect the future of the railroad employee?

It does not occur to me that the employees of railroad companies have any more need to fear than the employees of any other branch of industry. One thing is certain, the railroad companies have and always will have certain work to be done, and no matter who holds the stock and bonds of the corporations, they will have to be operated, a certain amount of work will have to be done in operation and maintenance, and the capable men in every branch of the service will be retained to perform this work. In the past there has been too much tendency on the part of some railroad employees to be from choice at war with their employers. They are very lax in their conceptions of actual justice. They contend strenuously for limiting the hours of labor, but exhibit little interest in the quality of their work or in the welfare of the company which employs them. They are very slow to reciprocate the kindness with which the managements of the companies always seek to promote their well being.

True, the requirements for success in railroading are demanding the best men along every line, those with a deeper knowledge and a wider experience than formerly, which tends to a thorough specialization for particular work in the different departments, such as executive, transportation, traffic, maintenance of way, accounting, legal, etc.

Pensioners on the bounty of railroads have begun to see the "handwriting on the wall," and henceforth there must be a *quid pro quo* for the salaries paid; sentiment will no longer wield the same influence in the retention of men or women in the railroad service. Merit and special capacity for the work assigned must be the reason for employment. Railroads are to be operated for the return on the investment rather than to keep persons employed regardless of the proportion of operating expenses to gross earnings.

In view of the fact that for the last twenty years the rates for the transportation of passengers and freight have steadily decreased, though the public has demanded increased facilities which of course meant increased expenditure by the railroads, had the railroad companies not adopted stringent measures to meet this continual tendency to lower cost for transportation by making improvements in their roadbed by reduction of grades, etc., and by the building of larger cars, and engines of increased capacity, they would not have been able to meet their fixed charges, let alone pay any return to stockholders.

The question is one of the survival of the fittest and this law which holds good in so many other branches of business is beginning to assert itself with greater force in the railroad world. But for the capable men there need be no fear. Their services are in greater demand than before. The men who can accomplish the most are the ones sought after.

A philosopher has said: "The work that we do is the measure and outcome of our character. What we do, that we are." We are judged by the results of our efforts. What we accomplish determines our value to the interests we serve. To every position there is the imperative obligation of service, and we may rest assured that the one who is chief over his fellows is such because he is actually servant of them all.

As a general proposition, therefore, we are in one situation or another according to our nature and capacity. If we take into consideration the diversity of aptitudes and mental endowments, we shall find this to be substantially true. There is not any large proportion of individuals who have in a marked degree the faculties for organization and administration. The ambition of the great mass of mankind seems to go no further than with moderate exertion and a fair share of ease to pass on through life doing common things in a common way. It is not for such to find fault with others who, making the necessary effort and acquiring by their diligence the requisite skill for gaining ruling positions, attain to greater distinction. Under the common law of competition, power and capital will generally fall to those who have the larger capacity for business, and they will take the management of affairs. Everyone of us is here for a purpose, to do work which others may not or would not do so well. Let us, therefore, never fear but accept our vocation heartily and perform its offices faithfully.

W. H. BRUCE.

### Meeting of the Engineering and Maintenance of Way Association.

The second annual meeting of the American Railway Engineering and Maintenance of Way Association was held at the Auditorium Hotel, Chicago, on March 12, 13 and 14. The first session was opened at 10 o'clock Tuesday morning by the President, Mr. J. F. Wallace, Assistant General Manager of the Illinois Central, who presided at all the sessions.

*Entertainments.*—On Tuesday evening the Technical Club gave the Association a reception at the house of the Club. On Wednesday afternoon the South Works of the Illinois Steel Company were visited, a special train being furnished by the Illinois Central. On Wednesday evening the annual banquet was held at the Auditorium Hotel, over 200 being present.

*Election of Officers.*—At the last session of the convention the following were elected offices for next year: President, G. W. Kittredge, Chief Engineer Cleveland, Cincinnati, Chicago & St. Louis; First Vice-President, Hunter McDonald, Chief Engineer Nashville, Chattanooga & St. Louis; Second Vice-President, A. W. Sullivan, Assistant Second Vice-President Illinois Central; Secretary, L. C. Fritch, Superintendent Baltimore & Ohio Southwestern and Treasurer, W. S. Dawley, Chief Engineer Chicago & Eastern Illinois. Directors for three years: J. Kruttschnitt, Fourth Vice-President and General Manager Southern Pacific, and T. F. Whittelsey, General Superintendent Ohio Central Lines.

The Treasurer reported that the total receipts for the year were $6,902.85, the expenditures $4,792.35, and the balance on hand, $3,370.50. The Secretary reported that the membership was now 360; nine have died and seven have resigned up to this time. The membership is divided, geographically, as follows: United States, 332; Canada, 16; Mexico, 8; Central America, 2; West Australia 1, and Japan, 1. During the year the following have died: Mr. W. G. Curtis, Engineer Maintenance of Way Southern Pacific and Second Vice-President of the Association; Mr. L. H. Clark, Lake Shore & Michigan Southern; Mr. D. J. Casey, Chief Engineer of the Detroit & Mackinac; Mr. S. E. Burke, Engineer Maintenance of Way of the Cleveland, Akron & Columbus, and Mr. H. W. Schmidt, Chief Engineer and Superintendent of the Illinois Southern.

*President's Address.*—In his opening address, Mr. Wallace said in part:

The hand-to-mouth method of managing railroads, particularly as applied to maintenance problems, is rapidly passing into disuse, and more consideration is being given, year by year, to the true economy of maintenance. In the ideal maintenance of any railroad property, the sums expended should not vary materially from year to year; the different classes of renewals should be made systematically and regularly, regardless of temporary fluctuations in earnings. The closer the management can get to regularity in its maintenance expenses, the more economical results will be obtained. The railroad situation in this country is rapidly approaching a condition of permanency, and as owners and managers can predict from past records with reasonable accuracy their probable revenues, they should be able to closely estimate the sums required for future maintenance.

When the Chief Engineer, General Superintendent or whatever officer has charge of the physical condition of the property can lay before his General Manager carefully prepared and accurate budgets of expenses for the year, as well as estimates of the normal amounts that should be spent on the different items, the haphazard methods of management in this respect will rapidly disappear and the work will be intelligently and satisfactorily handled. The worry of explaining why the expenditures in any certain month were more than in the previous year will be done away with.

While there are items which cannot be provided for with regular annual appropriations the average amounts can be determined with approximate accuracy; and certain sums could be charged out and set aside to cover these extraordinary renewals. The minor items, such as renewals of wooden bridges or their replacement by more permanent structures, the widening of excavations, strengthening of embankments, renewal of ballast and ties, minor repairs to buildings and structures, fencing and the many items that enter into the repairs of road account, should, however, be approximately determined and the amounts expended therefor made uniform. When the work is laid out and carried forward on some such basis, comparative statements will then be of more value and the fluctuations above or below normal will be due to causes which can be determined and explained, and the comparative efficiency of different men in the economical handling of road department matters more reliably observed.

I want to call attention to something we have all had experience with. We all have seen or known of railroads that have been in the charge of engineers who work to put the property in proper condition, and we have seen that management criticised for extravagance and we have seen that followed by some "practical" man who would cut expenses down to the core and make a reputation on what his predecessor had done. On the other hand, we have seen men put in charge of property who have had to spend lots of money in order to make good the deficit and make good the amounts that had practically been cut in two in order to make some previous person's reputation. And it is just such things as these that require some method in apportioning the money to provide for these expenses, to do away with such conditions as I have described. One of the questions which our various committees should determine by the collection of facts from the experience of different roads and the sums expended by them on the different items of maintenance is the approximate normal amounts for the proper maintenance of railroad properties. It is, of course, true that we should not be misled by averages, as conditions vary on the different roads, due to physical, climatic or traffic characteristics; but the consideration of this question along these lines will be beneficial and educational, and will very materially help both the officers having direct control of maintenance of way expenditures and the managements.

In these remarks attention has only been called to fundamental principles and the general lines along which this important subject of economical railroad maintenance should be approached. Above all things, we should give consideration to the proper relation of things, and not fall into the error which many engineers make, of looking at this question from a technical standpoint only and endeavoring to rear the most substantial and perfect monuments to their own skill, building structures to which they can point with pride as samples of their work, and losing sight of the fact that the ultimate aim of railroad construction and maintenance is to provide for the safe, expeditious and economical handling of traffic. To this end all other considerations are subordinate.

*Grading and Roadbed.*—The report of the Committee on Graduation was presented. This was printed by abstract in our last issue, p. 185. The discussion was opened by the Chairman of the Committee and a short report of it follows:

W. McNab, Assistant Engineer of the Grand Trunk Railway—It may not be out of place for me as Chairman of the committee to characterize this as a "progress" report. To overtake all in 12 months, or in any prescribed time, was never contemplated by the Committee. We took the ground that this Association is practically the authority on maintenance matters, and that it was better to get a portion of the work into such shape that some practical use could be made of it than to treat the whole of it in a superficial manner.

With this in view, we have determined to take up, first, the sub-division relating to cross-sections, that being a matter that every railroad is primarily and directly interested in.

Mr. W. M. Camp—The Committee says the least width of roadbed on embankments, etc., should be 20 ft. I have not found more than one road that has a width of 20 ft. and that is the Illinois Central. Of course, you do not infer from that that it is the only road, but I think the roads are comparatively few that have a width of 20 ft. as a standard.

Mr. McNab—Twenty ft. has been put down as a minimum on what may be considered a first class road. There is no doubt about the benefit of a wide roadbed, and this Committee has expressed it in this way in order that roads contemplating improvements or extensions may have this in view.

President Wallace—For a first class road where you desire rock ballast about 18 in. deep, and providing a shoulder outside of the edge of the ballast of the embankment, for the workmen to stand on and to permit a tie to lie upon, and for the ordinary purpose of protecting the slope, you will find that 20 ft. figures an economical and practical width, and that was the reason it was adopted on the Illinois Central. Even with a standard of 20 ft. it is very difficult to attain and maintain an actual width of from 17 to 18 ft., because, of course, the edge of the work almost invariably washes off. On some parts of the Illinois Central embankments have been put up as wide as 22 ft. and sometimes 24 ft. It has been constructed of that width in order that it might afterwards be maintained at a 20-ft. width. The object of carrying the 20-ft. section right through excavations is, if you do not do that you break the continuity of your shoulder line, and it is a very difficult matter to have the ditches led out of cuts in a way that will avoid cutting into the embankments. The economy of regularity in your sections and width of embankments is considerably affected by the proper maintenance of wide roadways. I have personally passed over miles of well-ballasted roadbed in rock where there was more money wasted on the rock or gravel ballast, or whatever the ballast material was, that had slipped down the embankment or been used to fill up depressions in the depth of the roadbed, than it would have cost to maintain the wide, uniform, and well-lined roadbed. On the Illinois Central Railroad the standard width of 20 ft. is maintained on the main lines. On secondary lines the width is 18 ft. The branch lines that are ballasted lightly with gravel, or cinders, are sometimes made 16 ft., but 16 ft. is the minimum even on lines over which only about four trains a day are operated.

P. A. Peterson, Chief Engineer of the Canadian Pacific—With this minimum width of 20 ft. what depth of ballast is your allowance, and what width of shoulders?

President Wallace: One foot of ballast under the ties makes a ballast of about 18 in. in thickness. Our original shoulder was a foot beyond the edge of the ties, but the tendency is to increase that width to about 18 in.

D. W. Lum, Assistant General Superintendent Maintenance of Way, Southern Railway: It occurred to me that perhaps 20 ft. was a little wider than necessary to give a support to the ties, and that oftentimes perhaps it is incurring a greater expense than would be warranted in maintenance of way work, and that possibly we might have spent that money for something else that might be more needed in the same department. The 8½-ft. tie would allow, with a 20-ft. roadway, about 5 ft. 6 in. outside of the end of the tie; that is, to the edge of the roadbed. It costs money to maintain that area during the year; and it seems to me that 18 ft. would be sufficient for a roadbed until we had devoted our surplus money to more ballast, heavier bridges, and heavier rails.

Mr. C. Dougherty, Roadmaster of the Illinois Central: The width of our ballast on the subgrade is 15 ft. With a width of sub-grade of 18 ft., that would only leave us 1½ ft. from the edge of the ballast to the slope. We find that after a grade is put up it does not take very long for a corner of the embankment to wear off, and with a subgrade width of less than 20 ft. we have a great deal of trouble in keeping our ballast in place. It is evident as soon as the slop is affected, the ballast is weakened, making it more difficult to hold the track in line, and there is a greater tendency to have center-bound track. Our experience with a 20-ft. subgrade is that nothing less than that would be sufficient on our lines of track.

G. W. Kittredge, Chief Engineer, Cleveland, Cincinnati, Chicago & St. Louis—I quite agree with the Committee that on first class roads a minimum width of 20 ft. should be considered the standard. We had occasion recently to build a short cut-off line, not very long, and our specifications for that line provided that the width of the roadbed, exclusive of the ditches in the excavations, should be 24 ft. As the line was one they wanted to construct cheaply, we specified that the width of the embankment should be 16 ft. The object in making the distinction was that in the cuts especially we wanted good drainage. The fundamental principle of all good track is good drainage, and that cannot be obtained if the excavations are too narrow, and my practice has indicated that it has always been easier to widen embankments than it is to widen excavations after they are once made. So in the case of those lines which we wanted to construct cheaply, we made the embankment only 16 ft., expecting at some time as opportunity offered to widen it to the full width of 20 ft.; but in the meantime we wanted the cut of sufficient width to enable us to drain away our track, and maintain it there. I bear in mind some stretches of track that have been very materially improved and the problem very largely simplified by widening the cut. The cost of widening the cuts from a width of 17 or 18 ft. to a width of 20 ft. has been less than was actually spent in maintaining the narrow width; that is, the cost was less than we actually spent in keeping the track through these narrow cuts in good condition during the winter and early spring, when frost and moisture particularly affected it.

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*Yards.*—The report of the Committee on Yards and Terminals appeared in our issue of March 15, p. 183. The discussion was opened by the Chairman of the Committee.

A. W. Sullivan, Assistant Second Vice-President Illinois Central—The Committee calls the especial attention of the Association to the terms and definitions submitted in its report, which it would like to have definite action taken upon at this meeting. The Committee states in the conclusion of its report that it submits it for adoption. It is apparent to the Committee that we must have terms that have definite meanings, and the committee has labored with the definitions submitted in its report and considered those the best that it can offer to the Association, in the light which it has had upon the subject. The balance of the report is a discussion and is not as technical as it will become later on; but it shows the use which is made of the terms and definitions which are offered, and if the Association will adopt those definitions or show the Committee that they are not good definitions, which will answer the purpose equally well, it will accomplish as much work as the Committee would hope to do at a single meeting.

Mr. F. T. Hatch, Vandalia Lines—I would like the opinion of the members as to the word "cluster." It is a very awkward word; but, possibly, in the course of time we will get to like it, although I do not see why "yards," in the plural, would not answer all the purposes.

Mr. Sullivan—The term "cluster" is one which the Committee has been over very thoroughly on several occasions, but it is offered to the Association as being the best term that the Committee can suggest for its purpose. There is a necessity for having a term to provide for what is termed "cluster," to help in our nomenclature, which cannot well be covered by the term "yards" because of the fact that "yards" is a term which has been, is, and probably always will be, used so generally and so loosely that it will not have the meaning the Committee desires to be attached to this term. In the first place, the word "yard" the Committee defines as being an arrangement of three or more parallel tracks in a series, for the convenient switching or storage of cars. There is a difference between a series of yards and a cluster. There may be 100 yards side by side and still not be a cluster. A cluster is not plurality of yards. A cluster is an arrangement of yards in a series for a definite purpose.

A. Torrey, Chief Engineer, Michigan Central Railroad—Does the word "cluster" include the use of the words "eastbound and "westbound"? Does "cluster" apply to the whole outfit, the eastbound and westbound, if they happen to be side by side?

Mr. Sullivan—The term "cluster" would apply to each series separately. There would be a westbound cluster or an eastbound cluster. There is a pliability in the term sufficient to meet any of the requirements of the service; and the test of the propriety of its use lies in whether it meets the function; that is, whether it does the work of separating, classifying, and storing cars; whether the arrangement of yards of each different form is in a series, making a cluster and working as a whole.

H. D. Miles, Signal Engineer Michigan Central R. R.—It seems to me that the word "yards" should not be left out of the definition. The committee has not left it off in any of the other definitions. It seems to me better to use the term "series of yards," or "combination of yards." That would be a better term, and it would be better to keep that word in case there are clusters of other things. This term here will be used not only in the drafting room but in publications, if it is adopted, and in conversations, and it seems to me there could be no objection to having the word "yards."

H. G. Prout, Editor *Railroad Gazette*—Language is a very hard thing to make. You cannot force a word into a language, into ordinary use, unless it is applicable and obviously definite. It seems to me that if we adopt this word, we shall use it only when we are forced to, and with a reservation and a little smile of deprecation, as if to say, "Please don't take this seriously; I use it officially." It seems to me that the word "yard" would cover the whole layout, and then you would have your subordinate yards, your receiving yards, and your classification yards, etc.

President Wallace—I do not wish to add anything further to the discord on this question, but Col. Prout made a suggestion that he did not intend to make in his remark, that it might be that the use of the simple word "layout" would cover it.

Mr. Prout—"Layout" would be capital.

Mr. Sullivan—These definitions are all related to each other. The word "yard" is a unit. It is the elementary principle of the whole scheme of the definitions. You have got to have a yard to start with, and the definition is to find out what is its minimum. We must know what is the minimum status of the word "yard." That is the keynote of the whole series of definitions.

Mr. Robert Trimble, Principal Assistant Engineer Pennsylvania Lines West—I do not think we have a proper definition of a yard. I do not know that a yard will always admit of three or more parallel tracks. I think there are many cases where there may be three or more, and they may not be parallel, and yet it may be a yard, and I am not sure it is a good thing to say there shall be not less than three tracks in a yard, because I am not sure but that a poling yard might be two tracks.

Mr. Sullivan—It is physically impossible to make a yard out of two tracks. Furthermore, the Committee considered it was necessary to make a distinction between a set of passing tracks and a yard. Two passing tracks would be in no sense a yard. Two such tracks could not be made to serve the purpose of a yard, but when you have an arrangement of three tracks, then you can begin to develop the function of a yard, and as you add to the tracks and the skilful manner in which they are arranged in series, you can increase those functions very largely.

Mr. Hunter McDonald, Chief Engineer, Nashville, Chattanooga & St. Louis—The Committee has announced, in order to carry out its scheme, that it must have certain terms understood, and I think it is our duty, whether we approve of these terms or not, to at least allow the Committee the privilege of using them until we find something better. I move, therefore, that we adopt these terms as submitted, reserving the right to amend them in the future, as we find necessary. Carried.

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*Ballasting.*—This report was printed in our issue of March 15, p. 190. It was presented by the Chairman, who explained that the Committee had not had a meeting before the report was written and that now the Committee had decided to rewrite the conclusions, making them less definite. The discussion was not important.

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*Masonry.*—This report was printed by abstract in our issue of March 15, p. 190. The discussion was opened by the Chairman.

W. L. Breckinridge, Chief Engineer, Chicago, Burlington & Quincy—I believe there is nothing radical in this report. One point in question I will call the attention of the members of the Association to, is the classification of stone masonry. At a previous meeting the discussion of the subject appeared to be the definition of the term, the exact definition of the term, and also the manner of making a comparative statement of the value of temporary and permanent structures. This report covers these two questions and something on concrete masonry.

President Wallace: This report is practically divided into two elements. One is the recommendation of the classification and subdivision of the term, and the other is the general comments and explanations in reference to these subdivisions. The recommendation of the Committee calls for some action, either the receipt of the report and the adoption of the recommendation, or the referring to the recommendation back to the Committee for further consideration.

Mr. H. F. Baldwin—I move that we adopt the definition that they have given, leaving it to the discretion of the Committee to add such additional definitions and specification as may be necessary in order to make the next report more comprehensive and better understood by all of us. Carried.

President Wallace—The large amount of monolithic concrete work which has been constructed on various roads, particularly in the Middle West in the last ten years, it would seem to me would make the experience of our members interesting.

Mr. G. A. Mountain, Chief Engineer Canada Atlantic—I want to say a few words about the comparative cost of masonry and concrete. We are doing lots of work in concrete, which, in the old days, would cost an average of $8 a cubic yard for masonry. We have wooden trestles which have about reached their limit of age. We simply make a model, usually dressed lumber on the inside, to make a better facing, and put in our concrete. We find that hauling the cement 200 or 300 miles, getting the sand in close vicinity and the labor at $1.25 a day, we can put in this concrete at about $5 a cubic yard. There are cases where the center bent of the trestle must be buried in concrete. That is very easily done, whereas with masonry you have all these timbers cut out. We would not think of going back to masonry. I would like to have the Committee go into the question of the specification of concrete, as to the different quantities to use. Our experience with brick pipe culverts in a northern country is that the frost tears them to pieces; brick pipe culverts 3 ft. in diam. have had to come out. Whether that was an inferior brick or not, I don't know.

President Wallace—The brick piers on the Illinois Central south of the Ohio River have been in service over 40 years. We use brick for the walls of culverts almost entirely south of the river and concrete almost entirely north.

Mr. C. Dougherty, Roadmaster, Illinois Central—We have on the division with which I am connected two concrete arches, where we have been doing double track work, taking out an iron span, a single track span, and replacing it with duplicate brick concrete arches. One of these arches is 40 ft. in diam. The other is a combination of a 38-ft. arch and a 10-ft. arch. The thickness of the concrete at the top of the arch, I think, is 27 in.

These culverts were completed last season, and so far have been holding up very well.

Mr. George Houliston, Division Engineer Western New York & Pennsylvania Railroad—I had charge last summer, of the construction of a double track tunnel of concrete for the State Commission of Massachusetts, horseshoe tunnel, a soft clay, with considerable water in it. The outside ring was laid 6 in. and lined with asphalt to keep the water out, and then the balance of the concrete, about 2 ft., was laid inside. It made a very exact piece of work. The section we had was about a thousand feet long, and it is very satisfactory. Our work cost $7.13 a yard laid in this somewhat expensive way. The proportion was 1, 2 and 5, in Portland cement. Some shrinkage cracks have been noticed in the work laid in the hot summer months.

Mr. J. Dunn, Chief Engineer of the Atchison, Topeka & Santa Fe—We have been using concrete rather extensively, and particularly in small culverts, owing to the higher price of iron pipe, and we have found numerous cases where the concrete was more economical, but we have no very large structures of concrete. Stone is generally cheap, and we have used vitrified brick, and the results have been very satisfactory. In the joint track elevation work at 16th and Clark streets, in Chicago, there was a very large amount of concrete used, some 18,000 yds., and that has proved, I think, better than it would have been if it had been first class masonry; and it would have been impossible to build masonry there, owing to the contracted nature of the work. I believe the result of our experience shows good Portland cement concrete is equal to the best first class masonry, and probably better than most of it.

President Wallace—The use of concrete on the Illinois Central has extended over the last ten years, and I think that its value depends, first, on the cement, and, secondly, the honesty in the use and mixing of the material. With care taken in those two things, a first class article of cement and honest and careful mixing, the result has been first class, and the cost has been obtained at half to one-third what cut stone would have cost us in the same locality.

Mr. G. W. Kittridge, Chief Engineer Cleveland, Cincinnati, Chicago & St. Louis—The Big Four has used concrete construction very largely during the last three years. In fact, there has hardly been a piece of cut stone work, first class stone work, done on the road during the last three years. The largest piece of work was the construction of a double-arch bridge, which was extended for double-track purposes, each span of which was 34 ft. in diam. There was something like 1,200 cu. yds. of concrete in these arches and in the wing walls, and the wing walls and the lower part of the structure were built with Louisville cement for the core, with a Portland cement facing of about 6 in., and the arches were made of all Portland cement, using the American Portland. The cost of that work complete, exclusive of the preparation of the foundation, which, of course, varies with every structure, was $4.23 a cubic yard. That included all the cost of handling the material and the work, but did not include freight charges on the material over our own line. The cement was hauled free about 250 miles; the broken stone was hauled free about 80 or 90 miles. We made a charge for the timber that went in the centers and into the frames. We have done a great deal of smaller work than that, but that is the largest piece of arch work we have done.

Mr. W. K. McFarlin, Chief Engineer, Delaware, Lackawanna & Western—We put in two quite interesting pieces of concrete work this last winter, one over the Hackensack River in New Jersey, a river about 57 ft. deep, and with about 35 ft. of mud on the bottom of that. It is a navigable stream, of course, and we put in a draw span 220 ft. long, all on a concrete foundation. We cut off the piles 40 ft. under the water, and sunk the caissons by filling with concrete. There were 4,000 yds. of concrete in the two abutments, one center pier and four rest piers for the ends of the spans. There were 4,050 yds., as I remember it, of concrete, and we used 4,900 bbls. of cement. That was mixed with trap rock and Long Island sand.

Another piece of masonry is just completed at Buffalo. We had a draw bridge there in 17 ft. of water, rock bottom. It is a pretty busy piece of track, and I should judge they handle 150 or 200 cars of coal a day over it. We began the 1st of December to put in the masonry. It is completed now and the iron work is being erected. We dredged down to rock, put a frame down on the rock with guides, and put the concrete in in sacks. We did no pumping, and put in 12,000 sacks of concrete. This is now complete, and it looks first rate. That work only cost about $5.50 a yard, not including the switching. We mixed practically a barrel to the yard, and there will be no question about whether it will stand or not. We can tell that now. When we got to the top of the water, it was about 15 below zero. We brought the frame up and put a house over it and put a stove in it and finished the work in a hot house, so the frost never touched the work.

Mr. I. O. Walker, Division Engineer Nashville, Chattanooga & St. Louis Railway—We have just completed a street culvert under a bridge which is 65 ft. high. The concrete arch is 18 ft. 2 in. from the foundation to the crown of the arch inside. The first problem we struck in building that was that the outside dimensions were too great to get in between any spans in the trestle, and we got around this by building one span of the trestle right on the arch. In other words, the actual line of the arch coincides with the bent of the trestle, and the arch is high enough so that the crown of the arch came above what is ordinarily called the pile cap of the trestle. It is a frame trestle, and the piles in the lower bent are about 15 ft. from the ground. We left the posts of the trestle in place and boxed around them; after removing the boxes, the concrete lacked about 2 in. of touching these posts anywhere. In the spring, we are going on to finish filling over this arch, and we propose to remove the posts and fill the holes with concrete. The cement used was Louisville in the foundation, and about 30 in. of Louisville around the top of the piling, and the body of the arch up to the springing line is composed of Old Dominion cement, 1, 2 and 5, and above is Portland cement, mixed 1, 2 and 6. The whole structure is faced with 2 in. of German Portland cement, mixed 1 of cement and 2 sand, and this was carefully rammed in place just ahead of the rock concrete, so we got a very successful connection between this facing and the concrete proper.

Mr. H. McDonald, Chief Engineer Nashville, Chattanooga & St. Louis—The principal questions that present themselves to me are whether the quality of the cement could be determined by an inspection on the ground as the work progresses or at the point of manufacture. Our President has suggested that the principal thing was the quality of Portland cement, but a novice in the testing of cement will find that he has a good deal of trouble in telling whether it is properly tested or not. The next question of importance is the sand. The quality is not so important, provided it is durable and has sharp edges. The most instructive points, it seems to me, are failures, and while members are rather reticent about talking about failures they are very free about telling us about their successes.

Among some of the failures I have heard of are the absolute inability to secure a uniform junction between Portland cement and natural cement. In other words, it has been attempted to get a core of natural cement and an exterior of Portland cement, but so far as I have heard the matter has never been successful, and I think the present practice is to use a leaner material in the body and face it with a richer mixture.

Then another difficulty is the treatment of the faces, or how to obliterate the markings of the moulds, the treatment of it afterward, whether to chip it off and polish it smooth or cut it, and what to cut it with. All those matters are points which I think the Association will be very glad to be enlightened on, and it is possible that the Committee has collected data from the various roads as to what their practice has been, and I hope the Committee will publish, as an appendix to this report, such data as they have collected and which they think will be of interest.

Mr. H. W. Parkhurst, Engineer of Bridges, Illinois Central—During the last year in double track work on our line between here and Cairo we had in the original track at two points bridges of about 80-ft. span. The waterway in each case was largely in excess of the actual need, and the idea occurred to some of our engineering department to substitute concrete masonry in place of the iron bridges. In the one case the depth from grade line to the ordinary low water of the stream was rather more than 40 ft.; in the other about 26 or 28 ft. In the latter case there was a roadway passing through under the original bridge, as well as the stream. We have replaced the bridge with a double concrete arch, one of 36-ft. span built for double track, a substantial pier nearly as heavy as would be required for an abutment, and an arch of 10 ft. for the roadway. At each end of the parapet the usual wing walls, built at an angle of about 30 deg. with the axis of the arch, are constructed, and these are of sufficient thickness to stand the thrust of the embankments. There is only about 3 ft. of fill on the top of the crown of the arch under the ballast; I think 3 ft. including the ballasting. This arch has been completed and the double track was finished over it late last fall, and it has been in operation ever since. It was built of Portland cement concrete with natural cement concrete in the foundation. We found a very substantial, almost stratified clay beneath the original masonry and adjacent to it, so we got a very good foundation without piling.

In the other case a 40-ft. full center arch was made about 6 ft. in height and about 12 ft. of fill on the crown of the arch. That work was completed in December of last year. It became quite a problem to judge whether it would be safe before spring to permit the loaded trains and filling to be placed upon the arch, and to assist in determining this briquettes were made and tested from time to time to see the rate of setting. It was found that at the end of, say, four to six weeks, these briquettes, exposed to freezing and thawing, had from about 70 to 75 per cent. of the strength of similar briquettes that were exposed to the ordinary temperature of a warm room, say 65 to 70 deg. The setting seemed to proceed in spite of cold weather. We were able to complete the concrete of this large arch before there was any freezing weather. I think the lowest temperature we had was 20 to 24 deg., for one day only, so that we were pretty sure the concrete had thoroughly set before any loads were imposed upon it. It seems to do its duty without any trouble. I think that the crown of the arch was 3 ft. 9 in. for the 40-ft. arch, and 3 ft. 3 in. for the 36-ft. arch.

The arch ring, in the case of the larger arch, we took special pains with, as that was liable to be exposed to much worse conditions than the other. The arch ring was built and the tamping was done on lines as near the radius as possible. A section from 7 to 9 ft. long was built at one time, commencing with the parapet wall, and we nearly completed the whole parapet before starting the next section of concrete arch. The parapet stands about 4 ft. high above the top of the crown of the arch. That renders very substantial assistance in taking care of the arch itself. Then each arch section was, approximately, 8 ft. in length and separate.

Mr. McDonald—Do you consider it practicable to carry on construction of concrete masonry continuously? A great many specifications provide that the concrete work shall be carried on continuously, and I find some difficulty in doing it.

Mr. Parkhurst—I don't think it is practicable. We do not try to do that. We did, however, organize our forces and work in such a way as to complete each one of those arch sections I spoke of as a monolith without having it set from the time we started until we got through. But to do that we built the bench walls up 3 to 4 ft., I think, on the face on the spring line, starting the arch and carrying up a skewback to correspond to the radial lines at that point. The thickness of the arch at the point for the skewback was approximately between 7 and 8 ft., and that was finished off as nearly as could be to a radial line. And then the sections, which contained from 40 to 50 yds. each, were built in one monolithic mass, and we continued work until after dark in two or three cases.

Mr. Baldwin—I have noticed where natural cement had been used in the body of the work and Portland cement facing has been put on, the outer shell of Portland cement is cracking off from the other, and I am convinced that it is a mistake to use natural cement and Portland cement together.

Mr. W. E. Dauchy, Chief Engineer, Chicago, Rock Island & Pacific—I would like to say a word in regard to Portland cement concrete We follow the practice of using it to a large extent and very successfully, but I think a great deal is in the way it is done. In putting in concrete and putting on such a facing, we have always found that it is necessary to break the joints of the facing; that is to say, if we intend to put on a facing of 9 in. of Portland cement concrete, we start in some such way as this: In putting in the first layer we put in a foot face of Portland cement and the next layer we put in about 6 in., and the next layer a foot again, and so on out again. By putting it in this way we have never found that the facing scales off or shows any tendency to do so. I think, however, if it is put on as a facing wholly of the same thickness throughout, that this scaling does take place.

Chairman Peterson—Don't you think it would be better to put rich cement on the outside and leaner cement on the inside; that is, make it three to one on the outside and six to one on the inside?

Mr. Dauchy—I think that practice is very good also. But with the method of putting on the facing I spoke of, it wants to be put on so that it is all bonded in with the rest of the concrete. Our method of doing it is this: If we desire a facing of a certain thickness, as the material is got into the form, have a piece of iron or sheet iron, or something that can be readily set up between the division and the mixture of natural cement, placed upon one side of it and Portland upon the other, and then this division removed and the whole thing tamped together. By doing that and then breaking the joints as I spoke of I have never found a particle of trouble in having the Portland cement concrete scale off, and I have used it in that way for the last four or five years quite extensively.

Mr. A. S. Markley—I would like to know how the several roads handle the testing of cement. We cannot hold the cement long enough to get a test. We have been using cement for nine years, and we have never yet rejected a carload. As soon as we have a carload they want that identical car right away.

Mr. Parkhurst, Illinois Central—We test our cement before it is used. Our specifications provide that the contractors shall deliver it in time so that it can be tested. They are required to provide storage houses for cement and to unload it and put it in storage, and if it chances to be rejected we reload it and ship it away. That, I think, can be secured by specifications and by insisting upon compliance with them. For the purpose, however, of getting at the strength and the quality of the cement, we do that by means of tests of neat cement, and the inspector in charge of the work, the moment it is delivered, sends samples to the central office here in Chicago. The equipment of the office is sufficient generally so those tests can be made within one or two days of the date of their receipt, and the tests are made on a 24-hour test of neat cement. At the same time, briquettes are made for seven-day and 28-day tests from the same lot of cement. From 10 to 20 or 40 packages in a car, depending on the size of the packages, enough cement is sent so that three sets of briquettes can be made, 10 in a set. At the end of one day of 24 hours if that test does not show quite satisfactorily, the cement is not necessarily rejected. The seven-day test is made to determine it, and after the expiration of that time the cement is either accepted or rejected. The 28-day test is a matter of record.

Mr. Lewis, Baltimore & Ohio Southwestern—During the last two years we have done a good deal of concrete work, and the charge of testing the cement has come under my care. It was finally decided to accommodate

the mills on our line by maintaining a supply of accepted cement at the mill that could be purchased directly by the contractor, and we entered into agreements with a number of mills to that effect. We made arrangements to have inspectors visit the mills and inspect there, the samples being sent down and tested as before, and if the cement was satisfactory it was shipped out direct to the contractors in sealed cars, saving all delay and worry. When contractors wanted to buy the cement, the line inspectors would be sent to the mill that they wished to purchase it from, at the contractor's expense.

The testing itself was in line with the average testing that is going on throughout the country. We had to develop our own specifications. We started with a specification that was a very common one, simply stating the cement was to be of a certain tensile strength, and was to be sound. We gradually evolved a set of tests and requirements that, as the mills met them, we kept increasing. Our idea was to have as high a requirement as we could get the mills to come up to, and not increase the cost to ourselves for cement. We found we were greatly aided by a very ambitious corps of inspectors at the mills, and a very good grade of cement could be had at no extra cost.

The requirements were the usual ones of certain tensile strength, both neat and with sand, that it should pass a boiling test, that it should show a constancy of volume, and that it should have a certain degree of fineness.

A one-day test is really of no value at all for Portland cement, and it is a very hard thing to get a seven and 28-day test if your are testing it in the field. But in the mill there is plenty of time to get a 28-day test. A seven-day test should have a certain strength, which need not be high, with a good percentage of increase. If we were to get up another specification we would make the requirement that there should be a certain stated strength at the end of seven days, with 25 per cent. increase in 28 days.

A great many of the mills make loud complaints about the boiling test. In fact, there was some talk of the American cement mills combining against any such test last year. It was at a period when the American cements were selling at over $2 a barrel, and they claimed they would not sell to any one that specified the boiling test. When their cement went down to $1.60 you would find any mill very glad to meet the boiling test. Some people claim they see no connection between the boiling test and the results of the cement in practice. It may be merely a coincidence, but if so I will give it for what it is worth. We have found close comparison between our boiling test and the way the cement shows up in work. Where this work shows up poorly it has been from cement that did not stand the boiling test. We have had cement that did not stand the boiling test that has shown up all right, but I do not know of any case the other way.

For fineness of grinding we find our greatest trouble, and the boiling test is very closely connected with that. A cement that is finely ground usually boils fairly well and gives high strength with sand. It is altogether a matter of management at the mill. Nearly all American Portland cements are now ground very fine, and will meet a requirement of 95 to 97 per cent of a 100 sieve. But the natural cements have not come to any such degree of fine grinding as that. There is no reason why a natural cement should not be ground as fine as Portland. The fineness is about the most important element in the cement. The finer it is the coarser the engineer can mix it with sand and stone, therefore having a stronger cement or purer mixture.

The cost of conducting the work such as I have mentioned depends upon the amount of testing that you do. I can give you pretty accurate figures to show what it costs per briquette that is made up in the laboratory. That cost is very constant and that is made up with a force working at full time, and it will cost you a little over 7½ cents a briquette. That includes a little experimental work and boiling. With a force working about half time we found it costs us about 11 cents a briquette. We test about one briquette for every two barrels, so that the cost in the laboratory was between 3 and 4 cents, as a rule, for us per barrel of cement used. Where we were sending out every day from a single mill we brought the total expense to us for material, sampling and inspecting and testing at a central laboratory, including interest on the first cost and stationery and every incidental expense that could at all be connected with it, up to about 6 cents a barrel on the average run of the cement that we used for two years.

Mr. Peterson—I have mixed Portland cement at zero and put barrels of it on a bank of snow, and have tested it in the spring and have found it set just as hard as stone. I have laid cement in winter up to zero, 4-ft. walls, and in the spring have found that the cement had set just as hard as stone. A little scale, like two or three sheets of paper, would scale off the outside, but in the inside of the wall that cement would set well. That has not been one, but 20 times. I will say it has been done since 1876. Since that time scarcely a winter has passed that cement work has not been going on. And in some special cases, in building elevator walls, it has been going on all winter. As regards special precautions, I tried with hot water and hot stone and hot sand, and tried cold water and cold sand and cold stone, everything cold; but I did not find any difference. That was Portland cement.

(TO BE CONTINUED.)

## The Re-design of Freight Yards.

I

If a freight yard can be re-designed so that its present work can be done with one less switch engine and crew, a saving will be made of something over $20 a day, or $6,000 a year. This sum is the interest at 4 per cent. on say $150,000. It would then seem that it would be safe to spend any sum less than $150,000 on the re-design of a freight yard if the improved yard will save a switch engine.

If a freight yard can be re-designed so as to pass cars on an average in one hour less time, and if 2,000 cars pass through the yard every day there will be an average (2,000 divided by 24) of 83 more cars available for the uses of the railroad. These cars at $600 apiece would be worth $50,000, and it would be safe to spend any sum less than this to secure a single hour's saving to the cars without at all considering the other advantages from improved movement.

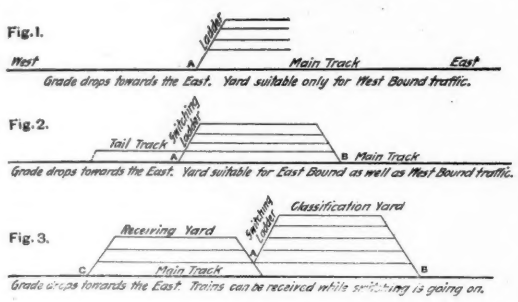
If a freight yard can be re-designed so as to avoid the "holding out" of road engines, there will be an immediate reduction in the "overtime" paid to the freight train men. If the "overtime" thus saved amounts to ten hours a day, at say $1.25 per train hour, the daily total of $12.50 per day is the interest upon say $100,000. It would be safe to spend any sum less than this to secure the saving of this overtime without considering the numerous other advantages including the increased efficiency of men and engines.

Here are three indications of the importance of the "yard problem" and they point to the more immediate importance of the re-design of yards rather than of their original design. Of course, to the designer the consideration of ideal yards is of advantage, but the practical railroad man usually has yards enough, and he cares much more about improving them than about building new ones.

II.

Fig. 1 represents the cheapest type of yard and, we may assume, the earliest type. On small railroads and at certain locations on large ones, it is still an available type, but it should only be used at points where only one engine works at a time. If a second engine arrives before the first is gone, one engine must wait for the other as the ladder track is used in both directions alternately and can only be occupied by one moving train at once.

On small railroads then, where freight trains run only




**Figs. 1, 2 and 3.—Elements of Yard Design.**

in single sections and at points where no switch engines are used, where freight engines "put away" and "make up" their own trains and trains arrive and leave at different hours of the day, such yards can still be used. At freight stations also, including docks, where single switch engines deliver, switch and remove all cars, such yards can well be used.

Such a simple yard would seem hardly worthy of serious consideration, but certain points should be regarded in its design and curiously enough have been only too frequently disregarded. First, the tracks should not be too long. In such a yard the cars "last in" are "first out" and with long tracks there is danger that the cars first in may never come out at all until the car accountant gets after them. Second, when there is a grade, as is usually the case, the ladder should be at the upper end of the yard. With such an assisting grade a surprising amount of work can be done by the despised old-fashioned "tail-switching." In case the ladder is put at the lower end of the grade the switching is slow and painful, so that the ladder should always be put at the top of the grade.

This introduces a complication, as trains arriving down hill only enter such a yard by making a flying switch. To avoid this the yard is modified as in Fig. 2, by the addition of a second ladder at the lower end of the yard. Here eastbound trains arriving down hill can pull in at "A" and the engine can run back from B to A to gain the advantage of the grade in shifting. Such a yard is often put down as more expensive than that shown in Fig. 1, on account of the extra frogs, switches and ladder track, and there are cases where an apparent saving is made, even at comparatively important points by providing a yard as in Fig. 1, for the traffic in one direction while a yard as in Fig. 2 is provided for the other. This is often of doubtful propriety. Efficient bumping blocks usually cost more than frogs and switches to maintain, if not to install, while the damage they do to cars is great.

Fig. 2 also shows a tail-track which is added to allow switching without interference with through trains on the main track. This tail-track is preferably connected with the main track at its upper end. When it is so connected, the connection at A may sometimes be omitted.

As stated above, such yards are available at division terminals where only one engine works at a time. The time when two engines are expected to work at one yard at a time is best marked by the running of freight trains in sections. This is done spasmodically at first and the want of economy due to yard design is not at first perceived, but it is perfectly evident with arriving trains that while an engine is "putting away" or classifying the first section, the engine of the second section must stand idly by waiting its turn. It is as evident that when trains are leaving, the engine of the second section cannot begin to make up its train until the first section has departed.

The difficulty is first felt by the crews, and especially the delay to arriving trains when the men are tired and want to rest. They immediately attack their trainmaster for a switch engine. The trainmaster seeing his arriving trains held out besieges the engineer for more standing

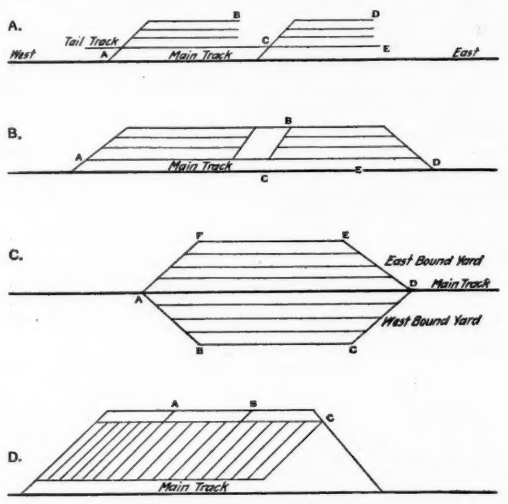



**Fig. 4.—Poorly Designed Yards.**

room in the yard. As soon as a few passenger trains are badly delayed both requests are granted. A switch engine is provided which is obliged to stand still whenever a train or engine enters or leaves the yard or a cabin is handled, and more storage room is provided, too often by simply adding more parallel tracks, or the lengthening of the yard.

When this is done a golden opportunity for a proper re-design is lost. What is needed is the simple addition of tracks parallel to the tail-track to form a receiving yard as in Fig. 3. Here eastbound trains can pull into the receiving yard at C without at all interfering with engines using other tracks as tail-tracks for switching. Of course, the switching will have to be stopped while empty engines move out on the main track at A, but this is about the only interference with the shifting that is absolutely necessary, as trains arriving westbound can back into the receiving yard at C and as trains in both directions can leave the classification yard at B.

At some points it is better to make parallel ladders, both in the receiving and the classification yard, and to make each track the length of a train, but this is not always essential. It is essential to so arrange matters that every track in the receiving yard can feed into any track on the classification yard.

It seems a bold statement but it is safe to say that in the few steps outlined above we have got about as far in yard design as anyone has, in this country at least. Gridirons and starting lines are still theories with us and need not here be considered. All good freight yards in America are composed of receiving yards and classification yards and whatever difference they have is due to the different assignments of work and different methods of shifting used, and these are really differences in detail. Poling tracks or hump tracks may be interposed between the receiving and classification lines, or the east and westbound business separated, but the receiving and classification yards are always present.

There is some differences of opinion as to whether a yard like that in Fig. 3 is properly designed for westbound movement, or speaking generally whether the receiving yard should always be at the head of the grade, no matter what is the direction of the traffic. It is for this reason that it has here been assumed that the yards are to be used for tail-switching, for no one will deny that a tail-track should be at the head of a grade, and with this style of shifting, a tail-track can very naturally develop into a receiving yard. Now if in tail-switching it is economical to move the train again and again up to the tail-track in order to gain the advantage of the grade, it would certainly seem to follow that it is economical to do it once in order to secure the advantage of the grade in poling or "hump" switching. It would follow then, that the type of yard shown in Fig. 3 is always available and should always be followed in the re-design of freight yards located on grades.

It is not the purpose of this paper to elaborate upon the other necessary features of a freight yard, most of which must be arranged so as to suit local conditions. Suffice it to say that as traffic increases, and as it becomes more and more necessary to secure uninterrupted work by the switching engines, open tracks must be provided for handling the light engines and the cabins without interfering with the switching. It is frequently advisable to provide separate systems of tracks for car repairs, for holding cars without known destination and for

storage. As intimated above we have foreign precedents for "gridirons" (that is, station order yards) and starting yards.

Again, as a yard grows in importance a telephone service must be arranged and the yard offices and the control of the switches must be centered at proper strategic points.

But no one of these details, or the others which will grow necessary, will make your yard a good one if you have failed in your first design and have neglected the receiving yard at the head of the grade.

III.

Finally, let us examine the design of yards which have been enlarged on incorrect principles. It is hard to say they have been re-designed, let us assume that, like Topsy, they "growed," and, like her, they grew bad. Of course, there are many ways of building bad yards, but the four shown in Fig. 4 may stand for the rest.

Fig. 4-A is at a point where westbound business only is handled. Originally the yard was like that in Fig. 1, but when the trains began to run in two sections, a second yard was built, the duplicate of the first, so that two engines could put away their trains at once. This method was simple but hardly satisfactory. When a third section arrives it must wait until the work on the first two sections is over, but worse than that, the cars are never properly classified. Whenever, as frequently occurs, each of the two sections arriving has cars for one point, as Chicago, these Chicago cars will be separated, some being left in each yard, and an engine leaving for Chicago will have to take cars from both yards. This process cannot of course be done without stopping all other work in both yards. This yard would be vastly improved by ladders from B to C and D to E, when it would approach the type of Fig. 3.

Yards like Fig. 4-B are built to provide a maximum "storage room" and also with the idea of working several engines at once, the idea being that one engine can work on each ladder. It is forgotten that storage and classification are entirely different matters and that when it is necessary to store cars it should be done in a separate place after they are well classified. Now in this yard, as in Fig. 4-A, a proper classification is impossible and the work of switch engines must stop every time a train, or an engine, or a cabin enters or leaves this yard. This yard can be brought to the type of Fig. 3 by building a ladder from B to E. This sacrifices the storage room of the triangle, B E C, but the improvement of the yard is great.

Fig. 4-C will typify the places where the eastbound and westbound yards are on different sides of the track. Here every engine and cabin must cross over sooner or later to get its return train. This is of little importance with a light traffic, but when there are many passenger trains it should be avoided by a proper disposition of the running tracks. Receiving yards should, of course, be also added.

Fig. 4-D shows an ingenious method of utilizing a long and narrow strip of ground by making the yard tracks diagonal to the main track. As shown, three switch engines can work at once, at A, B and C. Here, as in Fig. 4-A, the classification is never properly done and cars for one point may be found in three parts of the yard. A receiving yard should be added here even if this necessitates the tearing up of some of the tracks.

When busy yards are re-designed on proper lines the cost of the changes will always be justified by the economies which will follow at once as indicated above. Besides, there are frequent cases where yards at important points are really limiting the capacity of our railroads, and in such cases much greater expenditure in the redesign of yards is justifiable. G. F. J.

## 120 Miles an Hour.

On Friday, March 1, a mail train, consisting of engine, mail car, baggage car and sleeping car, was run over the Savannah, Florida & Western from Fleming, 24 miles south of Savannah, to Jacksonville, Fla., 149 miles, in 130 minutes, or at the rate of 68.8 miles an hour. This time includes one stop, and there were two other places where speed had to be slackened. The newspaper account further stated that near Screven, from the sixty-ninth to the seventy-fourth mile post, the time was 2 minutes 30 seconds, equal to 120 miles an hour. As this is an unheard-of record, we made inquiry concerning the accuracy of the timing, and we have a reply from Mr. W. E. Symons, Superintendent of Motive Power of the Plant System, operating this road, which confirms the account; but, as no stop watches were used, and as the time of passing each mile post is not given, we are not sure that an incredulous world will unreservedly accept the record. At the same time Mr. Symons says that the times were noted by a traveling engineer who was on the engine, and that the train despatcher's record confirms this timing. The train despatcher's record is, we presume, the usual timing at the stations, which presumably are not exactly opposite the mile posts.

The locomotive was No. 111, a 10-wheeler, burning bituminous coal. This engine is one of six built by the Rhode Island Locomotive Works last summer. The engine weighs 146,000 lbs., of which 108,000 lbs. is on the drivers. The cylinders are 19 in. x 28 in., and the driving wheels are 73 in. in diameter. The boiler is the extended wagon top type, with 300 flues 2 in. in diameter and 14 ft. long. This class of engine was described and illustrated in the *Railroad Gazette* Nov. 2, 1900, p. 722.

The weight of the train is not given. The train was one which was run regularly for a week or two to carry the through mails, pending a rearrangement of the time-table, to meet the wishes of the Post-Office Department or connecting railroads, and the speed on this trip was increased on account of a delay north of Fleming.

The profile of the line from Fleming to Jacksonville is undulating, but has no ascending grades more than three or four miles long, and the steepest of these are about 30 ft. to the mile. The five-mile section from mile post 69 to mile post 74 is ascending for about half a mile near the beginning, and then for three miles is descending, at about 30 ft. to the mile; the remaining mile is level.

The locomotive was in charge of engineman A. H. Lodge.

## Exhibits at the Maintenance of Way Meeting, Chicago.

The exhibits at the second annual meeting of the Railway Engineering and Maintenance of Way Association were installed in one of the large parlors of the Auditorium Hotel. A very creditable showing was made by the supply houses, but in the nature of things it was not possible to exhibit bulky appliances and machines. These, however, were satisfactorily represented by models and photographs. A list of the exhibits follows:

American Hoist & Derrick Co., St. Paul, Chicago and New York.—Photographs of 40-ton locomotive cranes, jib cranes, hoisting engines, derricks, etc.

American Steel & Wire Co., Chicago.—Wire railroad fencing.

The American Washer & Mfg. Co., Chicago, Ill., and Newark, N. J.—D. O. Ward rail joints, Ward insulating joints, eyeless picks and nut-locking washers, and all kinds of plain coil washers from ⅜ in. to 3 in.

Anderson DuPuy & Co., Pittsburgh, Pa.—Full line of railroad track tools and assortment of bolster, draft and special coil springs.

The Bonzano Rail Joint Co., Philadelphia, Pa.—The Bonzano rail joint. (Full size.)

Cambria Steel Co., Philadelphia, Pa.—"One hundred Per Cent." rail joint, full size.

A. M. Crane & Co., Chicago.—Simplex car jacks and the Greer spikes.

Diamond State Steel Co., Wilmington, Del.—Tie plates, spikes, bolts, springs, nut locks, etc.

Dilworth, Porter & Co., Pittsburgh Pa.—Goldie spikes, Goldie tie plates and the Glendon flange tie plates.

Dressel Railway Lamp Works, New York and Chicago.—A complete line of switch signal lamps.

Paul Dickinson, Chicago.—Universal chimney and ventilator for roundhouses, buildings, etc.

Drexel Railway Supply Co., Chicago.—Blue prints and catalogue showing the improved Gibraltar bumping post.

The Eyeless Tool Co., 26 Cortlandt street, New York, N. Y.—Track tools.

Eureka Nut Lock Co., Pittsburgh, Pa.—Nut locks, etc.

Edison Mfg. Co., New York.—A complete line of Lalande batteries for railroad signal work.

Fairbanks, Morse & Co., Chicago.—Barrett jacks. Models of hand cars, scales and the Williams track joint. Photographs of gasoline engines, compressors, heaters, turn-table machinery and ballast loaders.

Goldie, Jr. & Co., William, Pittsburgh, Pa.—Goldie "Perfect" tie plugs.

Hussey, Binns & Co., Pittsburgh, Pa.—Shovels, spades and scoops.

Iron City Tool Works, Pittsburgh, Pa.—Standard track tools.

International Railway Supply Co., Chicago.—A full sized automatic safety lock switch stand.

Inland Steel Co., Chicago.—Models of indestructible posts for railroad right-of-way.

Ingersoll-Sergeant Drill Co., Chicago.—Catalogue of air compressors, rock drills, etc.

Jones National Fence Co., Columbus, Ohio.—Samples of railroad fencing.

Kinnear Mfg. Co., Columbus, Ohio.—Sample sections of steel rolling doors, also photographs of buildings equipped with steel rolling doors and shutters.

August Kline, Utica, N. Y.—Model of car replacer.

Lidgerwood Mfg. Co., 36 Liberty street, New York, N. Y.—Photographs of electric winches and other specialties.

Link Belt Machinery Co., Chicago.—Full size link belt carrier for locomotive coaling stations, samples of chain and album of drawings of its complete coaling plants.

Manning Improved Rail Co., Baltimore, Md.—Model of improved rail and photographs showing the Manning convertible car. This car was on exhibition at the Grand Central Station, Chicago.

McDowell, Stocker & Co., Chicago.—Model of hand car manufactured by Imperial Mfg. Co., Newark, N. J., and catalogues of Higley portable rail saw.

Merrill-Stevens Mfg. Co., Niles, Mich.—Models of Cook junior cattle guard and the Cook standard guard.

National Lock Washer Co., The, Newark, N. J.—Nut lock washers, etc.

Norton, A. O., 167 Olive street, Boston, Mass.—Catalogues describing the Norton sure drop track jack and ball-bearing bridge and wrecking jacks, 8 to 70 tons capacity.

Otto Gas Engine Works, The, Chicago.—Slow closing device for tank valves, also photograph of tool car erected for the Chicago & Northwestern, equipped with 15 h.p. gasoline engine and Ingersoll-Sergeant air compressor.

Page Woven Wire Fence Co., Adrian, Mich.—Catalogue describing Page standard railroad fence.

Pennsylvania Steel Co., Steelton, Pa.—Models of spring frogs, switch stands and switches.

Perfection Rail Joint Co., Cynthiana, Ky.—Model of the Perfection rail joint.

Railroad Supply Co., Chicago.—Q. & W. tie plates and indestructible steel posts.

Roberts Car & Wheel Co., Three Rivers, Mich.—Catalogues describing hand, push and velocipede cars equipped with roller bearings and the Donovan improved pressed steel wheels without rivets or bolts.

Alden Spears' Sons Co., The, Boston, Mass.—Samples of asbestine cold water paints.

Spiritine Chemical Co., Wilmington, N. C.—Ties after being treated by the Spiritine wood preserving process.

Standard Railway Supply Co., Chicago.—A full line of track tools, coil springs, etc., manufactured by the Pittsburgh Steel Works (Anderson, DuPuy Co.), Pittsburgh, Pa.

Weber Railway Joint Mfg. Co., New York.—Weber compromise, Weber standard, Weber girder rail, and Weber insulated joints.

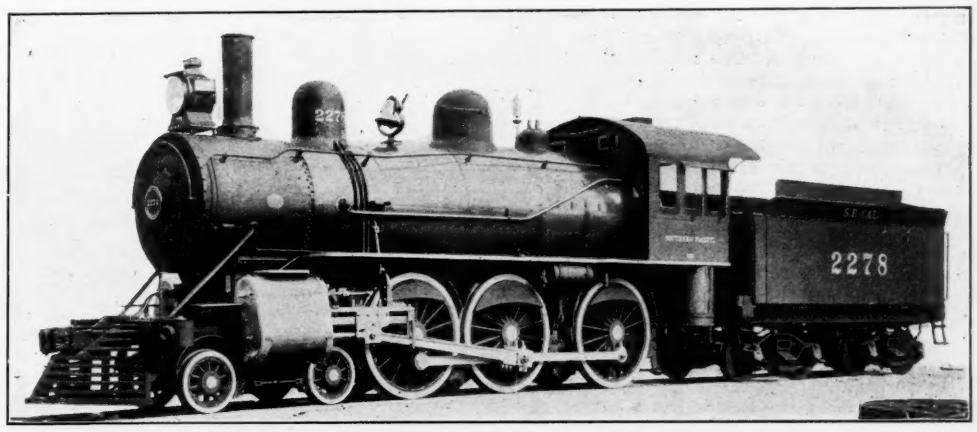
Wolhaupter, Benjamin, 6426 Kimbark avenue, Chicago.—Compromise, T., girder and insulated rail joints.

The following is a partial list of supply houses, without exhibits, who were in attendance at the convention:

Atlas Railway Supply Company, Chicago.
Buda Foundry & Manufacturing Company, Chicago.
Continuous Rail Joint Company, of Newark, N. J.
Illinois Steel Company, Chicago.
Ingersoll-Sergeant Drill Co.
Thornton, N., Motley & Co., New York.
Paige Iron Works, Harvey, Ill.
Phoenix Bridge Company, Philadelphia.
Ramapo Iron Works, Hillburn, N. Y.
Verona Tool Works, Pittsburgh, Pa.
Wilson Railway Gate Company, Birmingham, Mich.
Zanesville Iron Company, Zanesville, Ohio.
Elliott Frog & Switch Company, St. Louis.

## Cooke Ten-Wheel Locomotive—Southern Pacific Company.

The Cooke Locomotive & Machine Co. is building eight 10-wheel locomotives, with wide fire-box, for the Southern Pacific Company. The first engine of this order was recently delivered and it is here illustrated from a photograph. Four of the engines have piston valves and four have American Balance valves. Some of the principal features are as follows:




Cooke Ten-Wheel Locomotive—Southern Pacific Company.

| | |
|---|---|
| Gage | 4 ft. 8½ in. |
| Simple or compound | Simple. |
| Weight on drivers | 134,000 lbs. |
| Weight on truck wheels | 39,000 lbs. |
| Weight total | 173,000 lbs. |
| Weight tender loaded | 112,500 lbs. |
| Wheel base, total, of engine | 24 ft. 6 in. |
| Wheel base, driving | 13 ft. 8 in. |
| Wheel base total (engine and tender) | 52 ft. 2 in. |
| Height, center of boiler above rails | 8 ft. 5 11-16 in. |
| Height of stack above rails | 15 ft. 8⅞ in. |
| Heating surface, fire-box | 173.66 sq. ft. |
| Heating surface, tubes | 2,325.34 sq. ft. |
| Heating surface total | 2,499 sq. ft. |
| Grate area | 30.22 sq. ft. |
| Drivers, number | 6 |
| Drivers, diameter | 69 in. |
| Drivers, material of centers | Cast steel, diam. 62 in. |
| Truck wheels, diameter | 30½ in. |
| Journals, driving axle, size | Diam. 9 in. length 11 25-32 in. |
| Journals, truck, axle size | Diam. 6 in. length 9 15-16 |
| Cylinders, diameter | 20 in. |
| Piston, stroke | 28 in. |
| Steam ports, length | 18 in. |
| Steam ports, width | 1¾ in. |
| Exhaust ports, length | 18 in. |
| Exhaust ports, width | 3 in. |
| Valves, kind of | American Balance. |
| Valves, greatest travel | 6 in. |
| Valves, outside lap | 1 in. |
| Valves, inside lap | 1-32 in. |
| Boiler, type of | Extended wagon top. |
| Boiler, working steam pressure | 200 lbs. |
| Boiler, material in barrel | Carbon steel |
| Boiler, thickness of material in barrel | 11-16 in. |
| Boiler, diameter of barrel, first course | 66⅝ in. |
| Seams, kind of horizontal | Sextuple rivetted. |
| Crown sheet stayed with | Radial stays. |
| Fire-box, length | 108⅛ in. |
| Fire-box, width | 40¼ in. |
| Fire-box, material | Carbon steel |
| Grate, kind of | Rocking, finger bar |
| Tubes, number | 344 |
| Tubes, outside diameter | 2 in. |
| Tubes, length over sheets | 13 ft. |
| Exhaust nozzle, single or double | Single, permanent |

## Railroads and Famine in India.

In connection with the Indian Section of the Society of Arts, on Thursday last week Mr. Horace Bell, late Consulting Engineer for Railways to the Government of India, read a paper, "Railways and Famine in India," Mr. Bell said he wished to invite attention to a point which, as far as he was aware, had not yet been raised in dealing with famine problems, whether in India or elsewhere. The general conception was that railways must be a powerful agency for good, and that the more railways a country had the less likelihood would there be of pronounced food scarcity.

The primary cause of scarcity in India was deficient rainfall. The results of these scarcities could be greatly minimized by means of improved communications; but when vast areas had been affected, and the stress had been intensified, in spite of these better communication-

until food had risen to famine prices and five millions of people had been under relief, it was matter for grave consideration whether we had not overlooked other and secondary causes or conditions. On the authority of Lord Curzon, the area now remaining in India wh could be profitably benefited by irrigation projects was not more than four million acres. His own idea was that, taking the average of good and bad seasons, India was unable to stand the drain of its present export trade in foodstuffs, and that the agency they had looked to to avert scarcity of famine was acting, on the whole, the other way—he referred to our Indian railway system. It seemed an open question whether the railways were not serving to deplete the margin which should be held in order to meet possible scarcity.

Might it not be necessary, in face of approaching difficulties, to impose some restriction on the export of food grains? They were assured that railways would enable them to meet the scarcity in one province by throwing food into it from another more favorably circumstanced, and that they offered facilities to a stricken population of moving to more favored localities. But had they considered how Indian railways now served to give the country countless outside markets for its produce?—*Transport.*

## The New Yard at the Grand Central Station.

In connection with the recent rearrangement of the headhouse at the Grand Central Station, New York city, all of the tracks in the yard have been relaid with heavy rails, new sleepers and broken stone ballast. Many of them have been relocated, giving capacity for more cars in the shed and at the platforms, and the signaling has been completely changed. The mechanical interlocking machine and its connections have all been taken out and the cabin demolished, and in place of these a low-pressure pneumatic interlocking machine has been installed, in a new cabin, about 200 ft. north of the old one. The yard has been only slightly enlarged, however, and the word "new" in our title refers to the improvements here outlined, not to any change of location.

The tracks as now laid are shown in the accompanying plan. The former arrangement of these tracks was shown in the *Railroad Gazette* of June 23, 1899, when the station improvements were begun. At that time the mechanical locking had been recently renewed and some changes had been made in the tracks. The decision to introduce power interlocking and to make the radical changes now described was not reached until some time after the changes in the headhouse were begun.

Before referring to the signaling we may briefly mention the objects aimed at in changing the tracks. As is well known, the capacity of this yard has for several years been overtaxed; and the erection of the new main waiting room in the headhouse, which necessitated the cutting off of 73 ft. from the ends of the tracks in the shed, virtually made it necessary to push the whole yard that distance northward, and as much farther as it was possible to lengthen the several shed tracks by simplifying the arrangement of the ladders and switches. It will be observed that all or the shed tracks are now straight, out to a point beyond the baggage lifts, and in several cases much farther. In the old arrangement some of the pairs of tracks in the shed were run into a single track at or near the outer end of the shed (*A B*).

Track No. 12 will now hold a 17-car train, and the platform is extended, as shown, so as to accommodate such a train. Several other platforms also extend considerable distances outside the shed, as shown. The train shed has not been lengthened, but there is a canopy over each platform extending out to the baggage lift and about 4 ft. beyond. The outward baggage room extends from near the south end of the station northward to B (see diagram), as was shown in our description of the headhouse in 1899; and a subway for conveying baggage from this room to trains, extends to C, and thence across beneath the tracks to D. This subway, built at great expense and without interrupting the enormous traffic above it for a single minute, is 18 ft. wide, with concrete floor and walls. The side walls are 5 ft. thick at the bottom and 3 ft. at the top. It requires but little artificial light, as the glass sections in the floor of each platform let in a good deal of sunlight. The inward baggage room, the north end of which was formerly at A, has been extended about 260 ft. to E. This extension is a plain brick structure one story high and 20 ft. wide. The yard to the east of this extension affords access to the baggage room for mail wagons, baggage wagons, etc. This yard occupies the ground on which formerly stood the engine house of the New York Central. The engines formerly kept here now have to be all taken to Mott Haven, five miles out. Track Y from the New York, New Haven & Hartford roundhouse, F, southward to this yard has been put in so that engines leaving the roundhouse will not interfere with those entering. Tracks Y and Z are connected for this purpose. Heretofore the single track from the north was the only entrance to this house and turn-table.

The overhead bridge at 45th street is immediately above the baggage lifts. This bridge and the others crossing the yard, except that at 48th street, are for pedestrians only. That at 46th street has been extended eastward to cover the new track just mentioned. The old bridges at these crossings were taken down and new ones have been built. Some of the piers in the yard had to be rebuilt in slightly different locations.

The most important improvement in the arrangement of the tracks is the addition of the new ladder extending from switch m northward to switch n, so as to provide for two simultaneous movements from the inbound shed tracks, 2 to 8, etc., to 48th street and beyond; and the three new tracks on the ground formerly occupied by the old signal cabin and lead-outs (extensions of tracks 11 and 12). The new space in tracks 11 and 12 will be utilized in the busy hours between 4 p. m. and 8 p. m. for engines waiting to take trains out. These engines are backed down from Mott Haven in groups of six, eight and ten, and some of them have to be brought down a considerable time before their trains are ready to go. A standpipe is to be put in between tracks 11 and 12 at or about the point marked S, so that engines waiting on these tracks can be supplied with water.

A new cross-over track, which considerably facilitates outward movements, is that from switch p to switch q. The extension of track No. 20 to switch 147 gives better accommodation for long out-bound trains.

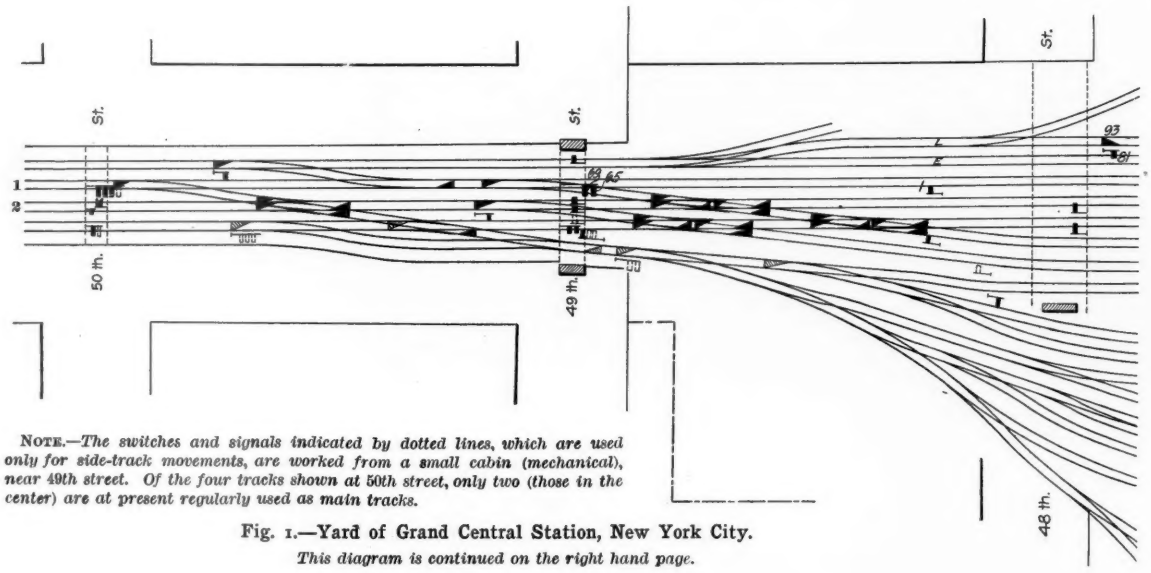
The number of trains entering this yard in the morning and in the evening is so large that it has been found impossible to wholly abandon the long-standing practice of running trains in by a flying switch, but the facilities for making the "fly" runs have been decidedly improved. The switches where this is done are Nos. 71 and 72. The trains come in on track No. 1 (see Fig. 1), and are guided by signals 65 and 69 at 49th street. The engines run to track No. 9; switch 71 is thrown to turn the cars to tracks 2 and 8, inclusive, and switch 72 turns them to tracks 10, 11 and 12. The pneumatic cylinders for these two switches are located just outside the cabin, at a point marked P, and from this point are connected to the switches by solid iron rods. This is done to provide the quickest possible movement. Besides making the rods solid, the engineer has reinforced the bell-cranks with a wrought iron connecting piece, making each crank a triangle, with the new piece for the long side of the triangle.

The signals which are cleared for the fly movements are the first, second and third arms (68, 70 and 67) on the bridge close to the switch.

No. 70 is for track No. 9 (engines); 68 is for cars which are to diverge to the right, and 67 for those which are to diverge to the left. The interlocking is so arranged that the signalman must move the fly switch once, to test it, and put it back to normal, before he attempts to clear the signal; having done this he clears two arms; 70 and 68 for cars going to the right (switch 72); and 70 and 67 for cars going to the left (switch 71). Signals 65 and 69 cannot be cleared until a clear signal is given at 47th street, and 69 is cleared only in case two arms are "off" at 47th street. In the case of a train which is to be run in to the station solid, without flying, 65 is cleared, and 69 not.

The machine at the Grand Central (tower No. 1) now works the switches and signals shown in our right-hand drawing, and will also work those shown in the left-hand drawing as soon as the pneumatic apparatus is ready. This last-named position of the yard is still worked by mechanical connections, and levers from old tower No. 2. The drawing shows the switches as they will be arranged after the completion of certain changes now or soon to be made. The only functions shown on the drawing on the left-hand page that are now worked by pneumatic pressure are signals 69 and 65, as before described. The machine, when completed, will have about 180 levers, taking the place of 235 in the two old towers. The 110 levers now in use work 13 switches, 28 cross-overs, 16 double slips, and 67 signals.

The low-pressure pneumatic signal apparatus was described in the *Railroad Gazette* of May 25, 1900, in connection with an installation at Jersey City, on the Erie road. The apparatus is made by the Standard Railroad Signal Company, of Troy, N. Y. The machine consists of a frame, with valves moving horizontally on its upper surface by which air is admitted to iron pipes leading (under ground) to the switches and signals. The operator, standing in front of the machine, moves the valves by pulling or pushing a valve or "lever" a few inches. The interlocking is of the ordinary mechanical type, placed vertically on the front of the machine, the tappets being moved up and down by means of a curved slot in the side of the horizontal bar ("lever") which opens and closes the air valve. The cylinder for working a switch lies horizontally on a suitable foundation parallel to the track, while the cylinder for a signal is placed vertically on the post a few feet below the semaphore arm. The admission of air to cylinders is controlled by a diaphragm valve fixed near the cylinder. This valve is lifted by a circular flexible diaphragm, 8 in. in diameter, which is moved by a pressure of only 7 lbs. to the square inch. With this pressure a movement 500 ft. from the cabin is made, and the "indication" returned to the cabin within two seconds. The most complicated route in the Grand Central yard can be set up in five seconds. The pressure of the air in the




NOTE.—*The switches and signals indicated by dotted lines, which are used only for side-track movements, are worked from a small cabin (mechanical), near 49th street. Of the four tracks shown at 50th street, only two (those in the center) are at present regularly used as main tracks.*

**Fig. 1.—Yard of Grand Central Station, New York City.**

*This diagram is continued on the right hand page.*

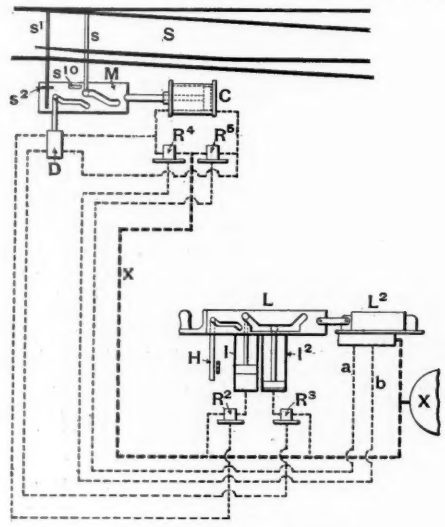



**Fig. 3.—Switch Movement.**

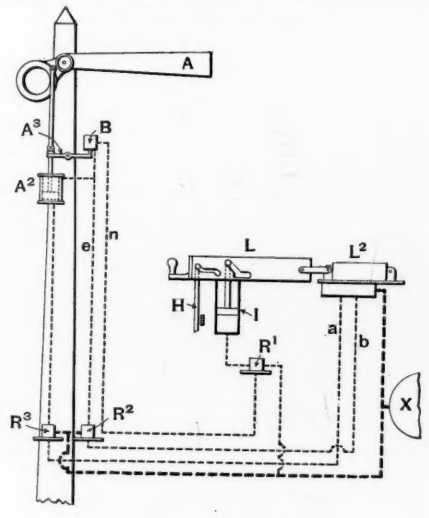



**Fig. 4.—Signal Movement.**

operating pipes is only 15 lbs. per square inch. Pressure is supplied through two main pipes, one on either side of the yard, the second main being added as a possible reserve in case of breakage of a pipe.

As in other power switch machines, the complete movement of a switch or signal is accomplished by the partial movement of a lever, and the remainder of the movement of the lever is dependent on the actual accomplishment of the desired movement at the switch or signal; but in this apparatus, in which no electric power is used, the final portion of the stroke of the lever is performed automatically by the air pressure which is produced at the machine by the movement of the switch rail or signal blade.

The arrangement of valves and pipes forming the connection between the interlocking machine and a switch cylinder is shown in Fig. 3. To change the position of the switch, the signalman grasps L by the handle and pulls it out. In doing this he admits air (from the main supply through the valve $L^2$) through pipe *a* to valve $R^5$, which opens communication from the supply X to the right-hand end of cylinder C, pushing the piston to the left. Observing now the slots in L and M, it will be noted that after about one-half the stroke of L has been completed it is stopped by the piston rod of $I^2$, but the operation of valve $R^5$, already accomplished, causes M to move through the whole of its stroke. This stroke of M is uninterrupted, but we may consider it in three parts. The first part, say, one-third, does not move the switch, but valve D is moved far enough to close the two pipes on its right, while those on its left are opened to the atmosphere. At the same time lock bar $s^1$ has been liberated at $s^2$. As M moves through the next or middle portion of its stroke it moves the switch; but it now produces no effect on valve D, because the rod of D is now engaged by the straight portion of its slot in plate M. The switch being set, the third and final part of the stroke of M locks the switch by pushing $s^{10}$ through a hole in $s^1$; and also (but not until after $s^{10}$ has entered its hole) the plate changes valve D, so as to connect together the two pipes at its lower end. This conveys pressure from the supply through $R^5$ and D to valve $R^5$, which valve then admits air from the supply to $I^2$ forcing the piston rod upward, and, by means of the diagonal portion of the slot in bar L, forcing this bar to complete its stroke.

By the action of $L^2$, pipe *a* is now opened to the atmosphere. Valve $R^5$ is now released from pressure and $R^4$ is closed; so that the right-hand pipe to cylinder C and its connection to and through D are open to the atmosphere. All four operating pipes are now at atmospheric pressure.

By the movement of L tappet H has been moved so ing levers (in the first part of the stroke of L) and the proper unlocking (in the last part of this stroke).

To move the switch back to its original position the opposite set of pipes is used.

To work a signal, valves and operating pipes are used of the same general style as those for a switch, but there is only one indicating valve and one indicating cylinder, as it is unnecessary to assure the attendant that a signal is in the go-ahead position.

The number of train movements to and from this yard is about 600 a day, necessitating about 3,000 engine movements. The number of lever movements on a normal day (about a year ago) was 31,115, or an average of 879 each hour. The largest hour-record, 8 a. m. to 9 a. m., was 1,740. These records are those of the old tower No. 1. The new tower and machine, as before stated, will control a much larger number of switches.

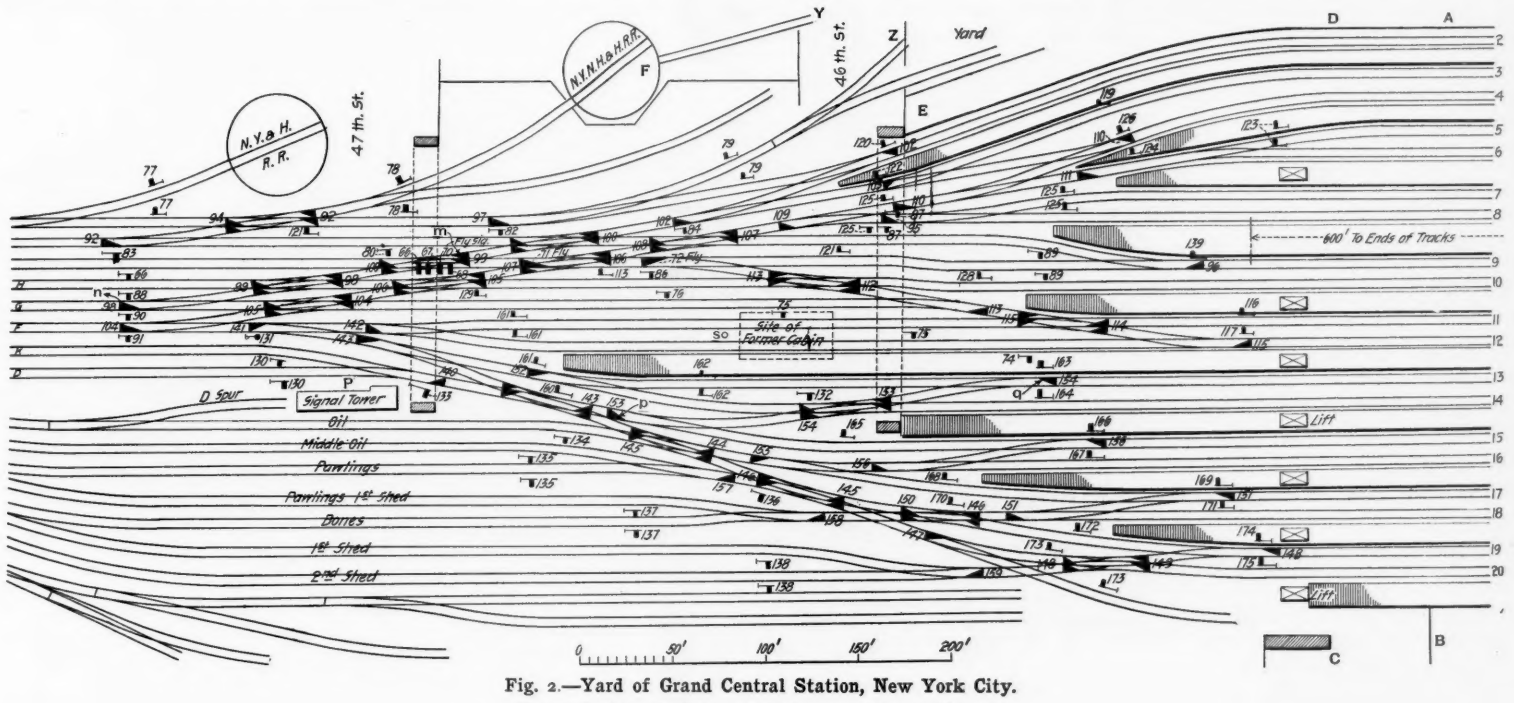



**Fig. 2.—Yard of Grand Central Station, New York City.**

*The northerly part of the yard is shown on the preceding page.*

## The Massena Power Canal.

The St. Lawrence Power Company, 40 Wall street, New York city, has recently issued an illustrated pamphlet designed to advertise the St. Lawrence Power Canal at Massena, now nearly completed. Although we have heretofore described this work in considerable detail a few particulars may well be repeated. Nature had provided an ideal situation in that a canal a little more than three miles long, entirely in excavation with no embankments, would give a head of 45 or 50 ft., with the Grasse River as a tail race. To exploit this situation the St. Lawrence Power Company was organized and incorporated in the State of New York with a capital of $6,000,000. The work of construction has been carried out by a contracting firm, the T. A. Gillespie Company, the engineers being Messrs. John Bogart, of New York, and Kincaid, Waller & Manville, of London.

The general dimensions of the canal are: Length 16,200 ft. and present width 192 ft. at the water line; the slope of the banks is 1½ to 1, and the average width at the bottom about 140 ft. The depth is 18 ft. at the St. Lawrence River end and about 20 ft. just before entering the forebay. The loss of head will be about 4½ ft. when working up to its full capacity, and the velocity of flow of water will be about 3½ miles per hour. The size of the forebay just above the power house is approximately 310 x 120 ft. and 25 ft. deep. The ultimate width of the canal will be 263 ft. at the water line, and all the abutments for the bridges are made with this in view.

The dam wall which forms one side of the power house is built of concrete, as are also the walls of the turbine chambers, foundations and the arches for the exit of the water from the draft tubes. The superstructure is steel construction filled with brick, and the exterior and interior of the building cement plastered. There are three draft tubes to each turbine chamber, each 10 ft. in diameter, the water of two turbines discharging through each tube. On the bed plate at the mouth of eacu draft tube sit two Victor turbines, 54 in. in diameter, of 1,000 h.p. each, working right and left so that the shaft thrust is neutralized. The speed of the wheels is 150 revolutions per minute, and the size of the shaft and journal at the dam wall is 12½ in. in diameter by 30 in. long. The wheels are controlled by an electric governor in the power house.

The exciter wheels are 27 in. in diameter, two to each exciter, discharging through one draft tube and operating at 275 revolutions per minute.

The dynamos, built by the Westinghouse Electric & Manufacturing Company, are of 5,000 h.p. output, 2,200 volts, 3,000 alternations, 3-phase revolving field type with external armature; speed, 150 revolutions per minute; 20 poles. Efficiency at full load, 96 per cent. Heating, full load, continuous 35 degrees rise. Bearings, 16 in. diameter, 65 in. long. Weight of revolving element, 80,000 lbs. Total weight, 350,000 lbs. Diameter of armature, 21 ft., of revolving element 15 ft. 2½ in. Size of base, 15 ft. 2½ x 21 ft. 2 in.

The switchboards for the alternating current machines and for the feeders will be operated electro-pneumatically, and for the exciters a standard direct-current switchboard will be installed with hand-operated switches. Each generator and feeder will have a separate switchboard in a gallery for the purpose. Each dynamo switchboard will be set directly opposite the dynamo, and cables connecting the switchboards with the dynamos run across the building in ducts for the purpose. All the switches will be operated from a pulpit in the center of the building, where will be placed all the indicating instruments in sight of the operator. The watt-meters will be on the feeder panels. There will be two sets of bus bars to which any of the panels or all of them can be connected. The feeder panels will be placed on the same gallery floor as the dynamo panels, but in adjoining bays of the building. The feeder cables will be carried in a gallery directly over the gallery for the panels, and the feeders will be carried out of either end of the building, where they will pass underground to a distributing point.

There are three exciters, each having 400 h.p., directly coupled to the turbine shaft. These operate at 275 revolutions per minute, at 125 volts.

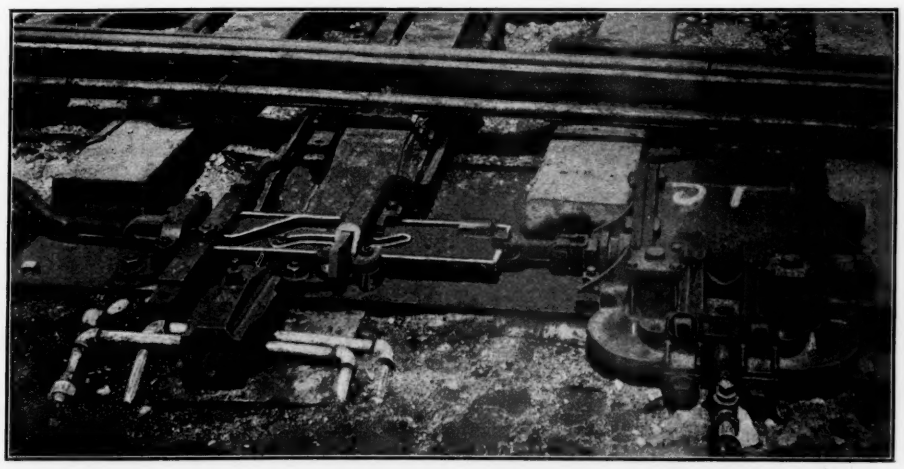


**Fig. 5.—Switch Movement.**

The country around the south end of Lake Baikal is so very broken that the route the railroad is to follow has only recently been located, at a time when hundreds of miles have been completed east of the lake, the connection being made by the car ferry. The final location, it is said, offers a more favorable route than was thought possible, with only two tunnels, and the railroad can be completed over it, it is said, within about two years, by which time the main line is expected to reach the Pacific. This part of the line might have waited longer, but for the troubles in China, which have shown how the capacity of the road is limited by its dependence on a ferry nearly 40 miles long.

RAILROAD GAZETTE

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## EDITORIAL ANNOUNCEMENTS.

*CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

*ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

The newspapers repeat, with considerable persistence, the report that the two railroads forming the line from Washington, D. C., to Richmond, Va., are to be consolidated, and that the consolidated company is to be controlled jointly by the five principal lines which connect with it, namely, the Pennsylvania, the Atlantic Coast Line, the Chesapeake & Ohio, the Southern and the Seabord Air Line. The report appears to be based on serious negotiations, but no officer of any of the interested lines confirms it. If it is not true it ought to be; for to build another railroad between Washington and Richmond, as has been lately threatened, would be a wasteful expenditure of money. That section of country is already well supplied with railroads. On the other hand, for the five roads named to make a friendly agreement to use this link between the North and South in common, would be a fine example of sound railroad management, and one which ought to be followed in other places. It is true that some sacrifices would probably have to be made by the roads which now occupy the most favorable situations, but those sacrifices would result in benefit to the public. The line from Washington to Quantico, 34 miles, is now owned by the Pennsylvania; the rest of the line (82 miles) is the Richmond, Fredericksburg & Potomac. This is an independent road, but the men who control the Atlantic Coast Line are supposed to have a very strong interest in it, if not virtual control. These two lines, then—the P. R. R. on the north, and the A. C. L. on the south—are the ones which appear to control the situation at present. But either one of the other three ought to be able to concede a good deal rather than build a new line to Washington; so that with the spirit of reasonableness which appears to prevail on all sides, the prospect of a union seems good. The Southern Railway would probably be one of the largest gainers by a joint ownership, as it could then run some of its through trains by way of Richmond. There would be improved economy in working, as the changing of engines and men would be diminished, and the public would doubtless get improved service in other ways.

### The Maintenance of Way Association.

The second annual convention of the American Railway Engineering and Maintenance of Way Association, lately held at Chicago, was full of interest and suggestion. Not only was the attendance large but each session was well attended and a serious spirit was evident among the members. The result gives pretty solid reasons to hope that the Association has really started on a long career of usefulness. That depends entirely on the sustained interest of the members, and there were many indications of such interest.

It is true that the discussion was not very widely scattered. A few men took the burden of it. This is always true of conventions of engineers and technical railroad societies, and we can hardly hope that it will change much. It is largely a matter of the temperament of our race. "Of all the nations of the world at present the English are the stupidest in speech, the wisest in action . . . Thou art of those great ones whose greatness the small passer-by does not discern. Thy very stupidity is wiser than their wisdom." If not precisely true, this is true enough to at least suggest the truth, and we on this side share the qualities of the race.

While it is not wise to encourage men to talk until they have something to say, it is important that the members of societies such as this Engineering and Maintenance of Way Association should go to their conventions with something to say. At one of the dinner speeches at Chicago the suggestion was made that this might be promoted by having the reports circulated earlier. There is no sufficient reason why these should not be in the hands of the Secretary early enough to get printed copies to the members a week at least before the meeting. This is merely a matter of fixing a time limit for the committees and pushing them. We all know that this is true, and also that human beings will generally take all the time that we will give them. With the reports in the hands of the members a week before the time of the meeting the quality of the discussion would doubtless be considerably improved.

The reports that were presented at the convention will compare well with those presented at the conventions of the Master Car Builders' and the Master Mechanics'. Some of them were excellent, some were not very good, but all will serve a purpose. The one obvious criticism brought against the reports as a whole is that they cover too much ground and are not specific enough. This was almost inevitable for it was necessary to plan the work in a comprehensive way. No doubt it will now be found that the committees will take up the subjects point by point, and elaborate the details, to the greater satisfaction of the members; but general reports give an excuse for special discussion, so that the members need not complain if the reports are too general, and as we say, it was necessary to start with pretty broad ground and somewhat loose generalization. It is well to think back sometimes to Spencer's formula: "Evolution is an integration of matter and concomitant dissipation of motion; during which the matter passes from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity; and during which the retained motion undergoes a parallel transformation." That is about what must happen to the new association if it is to live and produce results, as we all hope it will.

### Quality of the Steam Generated by a Locomotive.

For many years it has commonly been believed that the steam delivered by a locomotive boiler is at all times heavily charged with moisture. Such a belief on the part of men who appreciate the significance of the very high power to which such boilers are forced, and who frequently see showers of water thrown out from the top of the stack, is but natural; especially so, since until the advent of the testing plant only a few determinations had been made from which the facts in the case could be judged. It appears, however, that the general conception is not well sustained. It can now be safely asserted that under normal conditions of running the boiler of a locomotive delivers steam which is comparatively dry, the entrained moisture usually amounting to less than 1.5 per cent. If water does pass over with the steam it is because the water level is kept too high or because a sudden demand is made for steam. For example, if the throttle of a locomotive which has been for some time inactive, is quickly opened, steam bubbles are formed throughout the mass of water and crowd into the steam space. Their formation raises the water level and their rapid movement results in some spray in the dome, a portion of which may be carried past the throttle. A similar action occurs when an engine which has been working at a light load is suddenly required to increase its power. But these are exceptional conditions. When the conditions of running are uniform, the moisture passing the throttle is never great.

In 1893 the results of nineteen tests were presented to the American Society of Mechanical Engineers.* For these tests the quality of the steam in the boiler was ascertained from observations obtained from a calorimeter attached to one of the branch pipes in the smoke-box at a point half way between the T-head and the saddle, and by assuming adiabatic expansion between the dome and the point of observation. Each test was of several hours' duration, the conditions of running remaining unchanged. The results arranged in order of the rate of evaporation are as follows:

| Pounds of water evaporated per foot of heating surface each hour. | Per cent. of moisture in steam in boiler. |
|---|---|
| 3.07 | 1.25 |
| 3.27 | 0.90 |
| 3.31 | 0.97 |
| 3.46 | 0.89 |
| 3.74 | 0.81 |
| 4.59 | 0.78 |
| 5.00 | 0.90 |
| 5.21 | 1.16 |
| 5.25 | 0.98 |
| 5.29 | 0.94 |
| 5.77 | 0.72 |
| 5.99 | 0.97 |
| 6.05 | 1.10 |
| 6.30 | 0.82 |
| 6.60 | 1.01 |
| 6.96 | 1.00 |
| 9.40 | 1.10 |
| 9.50 | 1.00 |
| 10.01 | 0.80 |

It will be seen that the values for moisture thus obtained range from 0.72 to 1.25 per cent., the average being .95. Most of the tests were run at comparatively light power which would tend to keep down the moisture. After these tests had been reported, it was discovered that the steam in passing the branch pipes absorbs some heat from the smoke-box and that the sample supplied the calorimeter was dryer than it would have been under the assumption of adiabatic expansion from the boiler by about 0.25 of one per cent. Applying this value as a correction to the results given, makes the minimum per cent. of moisture observed 0.97 and the maximum 1.50. The corrected average for the series would be 1.2 per cent., which compares favorably with the quality of steam delivered by many stationary boilers.

At the last meeting of the American Society there were presented the results of thirty-five tests† and for these tests the quality of steam in the boiler was determined by means of a calorimeter attached directly to the dome of the boiler. The results, arranged in order as before, are reported to be as follows:

| Pounds of water evaporated per foot of heating surface each hour. | Per cent. of moisture in steam in boiler. |
|---|---|
| 5.48 | 0.49 |
| 5.57 | 0.63 |
| 5.97 | 1.62 |
| 6.03 | 0.78 |
| 6.16 | 1.06 |
| 7.20 | 0.76 |
| 7.30 | 0.68 |
| 8.05 | 0.83 |
| 8.06 | 1.00 |
| 8.47 | 0.63 |
| 8.51 | 0.68 |
| 8.56 | 0.87 |
| 8.57 | 0.69 |
| 8.80 | 1.22 |
| 9.13 | 1.49 |
| 9.24 | 1.14 |
| 9.31 | 1.40 |
| 9.51 | 0.90 |
| 9.57 | .88 |
| 9.58 | 1.20 |
| 10.13 | 1.29 |
| 10.23 | 1.31 |
| 11.25 | 0.94 |
| 11.29 | 1.29 |
| 11.31 | 1.06 |
| 11.42 | 1.62 |
| 11.42 | 1.29 |
| 11.52 | 1.27 |
| 12.12 | 1.44 |
| 12.16 | 1.34 |
| 12.29 | 1.24 |
| 12.77 | 1.11 |
| 12.93 | 0.70 |
| 13.81 | 1.13 |
| 14.73 | 1.11 |

The values for moisture, as determined in this series of tests range from 0.49 to 1.62, agreeing substantially with the corrected results for the first series. This is the more important because in one case the sample of steam was taken from the steam pipe and in the other directly from the dome of the boiler.

It will be of interest in this connection to follow briefly an investigation which had for its purpose a determination of the changes in the quality of the steam in its passage of the pipe in the smoke-box. It is well known that if steam is allowed to wire draw past the throttle of a locomotive, it will, if sufficiently dry in the boiler, become superheated at the lower pressure of the steam pipe. If the drop in pressure is as much as a hundred pounds, the steam at the lower pressure may become superheated 30 or 40 degrees, the exact amount depending upon the amount of moisture in boiler steam, which at the lower pressure must be evaporated before superheating can begin. In the investigation under consideration, the Purdue experimental locomotive was run under the throttle in order that all steam in the pipes between the throttle and the engine cylinder would be superheated. The advantage of this process lies in the fact that when steam is superheated, its quality is determined by merely observing pressure and temperature. An accurate thermometer, arranged to be perfectly steam jacketed, was placed in the T-head which serves to connect the main

*Tests of the Locomotive of Purdue University, Vol. XIV. of the Transactions, p. 826.

†Tests of the Boiler of the Purdue Locomotive, paper No. 878, A. S. M. E.

steam pipe with the branch pipes in the smoke-box. Another was placed in one of the branch pipes half way between the T-head and the saddle, and a third one was placed in the steam passage of the saddle. It was found that in passing half the length of the branch pipe, the steam absorbed sufficient heat from the smoke-box to increase its temperature 4.4 deg. As the amount of heat necessary to produce 16 deg. of superheat would, if imparted to moist steam, remove one per cent. of moisture therefrom, it is fair to assume that moist steam in passing one-half the length of the branch pipe will have its moisture reduced by a quarter of one per cent. which is the value already applied as a correction to results obtained from a calorimeter connected with the middle of the branch pipe.

While it is possible to apply the correction as stated, the logical conclusion is that the branch pipe is not a suitable place for a calorimeter designed to serve in determining the quality of the steam in the boiler, and justifies the wisdom of the recommendation of the joint committee of the Master Mechanics' Association and the Mechanical Engineers, which was appointed to recommend a standard method of testing locomotives, when they specified that the calorimeter should be attached to the dome of the boiler.

Another fact of interest which was disclosed by the investigation just described, is to be found in the rapidity with which steam loses its heat as it approaches the vicinity of the cylinder. Thus, it was found that in passing from the T-head through half the length of the branch pipe, superheated steam was increased in temperature 4.4 deg., which is equivalent to an increase of 8.8 deg. in passing the whole length of one branch pipe. Notwithstanding this fact the steam in the passage of the saddle on its way to the cylinder was found to be 8 deg. cooler than when it entered the T-head. Before it had succeeded in passing the saddle it had lost all the heat it had gained from the smoke-box and much besides. This is explained by the fact that the mean temperature of the cylinder is lower than the initial temperature of the steam, and it serves to draw heat from the metal of the saddle, which in turn is made good by heat supplied from the incoming steam.

## Annual Reports.

*Texas & Pacific.*—With an abundant cotton crop harvested and marketed at unsually good prices, and other circumstances greatly favoring tonnage movement, this company is able to make much the best report in its history for the past year, ending Dec. 31.

On gross earnings of $9,751,000 an increase is shown of $1,450,935, or 17½ per cent. Operating expenses decreased from 70½ to 67½ per cent. of the gross, and net earnings at $3,169,500 show an increase of $718,170, or over 29 per cent. The final result in the income account is a balance over all charges of $1,209,300, equal to nearly 5½ per cent. on the outstanding second mortgage income bonds. Since the close of the fiscal year a payment of 4 per cent.—against 1½ per cent. for 1899—has been declared on the bond issue, which is now nearly all held by the Missouri Pacific, and deposited by that company as part security for an issue of Iron Mountain Railway bonds. Through the purchase of these bonds the Missouri Pacific has secured a direct corporate interest in the Texas & Pacific Railway, there being previously no direct relation between the two companies, though both have been controlled for many years by the Gould family.

As indicating how substantial has been the improvement in revenue and growth in tonnage secured in the last year, the following figures showing the gross and net receipts, the percentage of expenses and the tons moved one mile, will be found of interest.

| | Gross earn. | Net earn. | P. C. exp. | Tons 1 mile. |
|---|---|---|---|---|
| 1900..... | $9,751,121 | $3,169,490 | 67½ | 670,535,000 |
| 1899..... | 8,300,186 | 2,451,320 | 70½ | 562,535,000 |
| 1898..... | 8,006,500 | 2,299,039 | 71⅓ | 512,005,500 |
| 1895..... | 7,588,649 | 2,174,540 | 71⅓ | 548,323,800 |
| 1896..... | 6,825,145 | 1,671,567 | 75½ | 414,477,300 |

As against the reported surplus balance over charges of $1,209,000, reported for 1900, it may be pointed out that there was a surplus of $31 as late as 1898, while in 1896 there was a deficit. Final income results, however, in all these years have been affected materially by the company's policy of charging current income heavily with the cost of improvements. The condition of its credit until within the last year or two would have prevented the sale of new capital except at heavy discount, even if bonds for betterment had been available. This condition has forced the company to carry out improvements from the surplus receipts as these permitted. Thus in 1899, $600,000 was appropriated for special work, and in the past year $655,000, of which $482,301 represented cost of new equipment, was similarly charged against surplus income. The addition of this amount to the surplus actually reported would have shown earnings of $1,792,300 as a free balance in 1900.

Examination of the details of earnings shows that freight traffic yielded $1,125,000, and passenger business, $239,300 of the total increase in gross income. Almost half the gain in freight revenue was due to the gain in cotton traffic, which nearly doubled in a year, from $593,000 to $1,134,000 in 1900. While cotton tonnage was only 4 per cent. of the total in 1899 and 6⅔ per cent. last year, revenue from this business increased from 10⅓ per cent. of all freight receipts to 16½ per cent. last year. The better returns from the movement of the cotton crop undoubtedly in large part explain the large growth in local business in the year, not only because of the heavier tonnage directly contributed, but on account of the improvement in the condition of the people along the line from the larger receipts on cotton sales.

Thus of the 285,000 tons representing the increase in traffic movement, through business contributed only 43,000 tons, and the proportion to the total tonnage decreased 4½ per cent. The increase in local tonnage was 243,000 tons, and the proportion of the total rose from 39½ per cent. in 1899 to 44 per cent. last year.

From these figures it appears that the Texas & Pacific, like most other companies reporting for recent periods, shows very much heavier proportionate increase in gross earnings than in traffic movement. Thus, though enlargement of tonnage reported above was only 11 per cent., the increase in local freight revenues, $705,400, was 30 per cent.; and the gain in through freight receipts, $419,200, was 12½ per cent. The increase reported in average rates for the year, however, is exceedingly small, and the increase in gross is due more to a change in class of traffic than to higher rates. Ton-mile receipts were 1.03 cents, against 1.02 cents in the previous year. Last year's rate, however, was the lowest ever received by the company, except in 1899. Since 1891 the tonnage moved has nearly doubled, and gross earnings have increased from $7,227,000 to $9,751,000 last year.

Details of expenses show that maintenance cost accounts for about half of the increase of $733,000 reported for 1900 and cost of transportation for $386,800.

Traffic was moved much more economically in the year. There was an increase of 106,000,000 ton-miles, or about 20 per cent., but train miles run increased 408,000 miles, or 12 per cent. The train load, which had been increased 17 tons in 1899, shows a further increase of 11 tons to 179 tons, this comparing with 130 tons in 1891. This higher train load has been mostly accomplished by better car loading. Since 1898 the average car load has been increased from 10.8 tons to 12.1 tons.

The *Railway Age* of March 15 contains a full report of the committee reports and the discussions at the Chicago meeting of the American Railway Engineering and Maintenance of Way Association. This is one of the most enterprising performances of that enterprising journal, and the members of the Association and others will appreciate the convenience of having the reports in hand so promptly. Doubtless this will also help the Secretary in editing the discussion for final publication, as probably various members will like to make some verbal corrections in their remarks, and now they will have an opportunity to do so.

## NEW PUBLICATIONS.

*The Permanent Way and Works of an Italian Railroad System;* A Report on Plans and Works executed from 1885 to 1897, with an Album of 134 plates. Milan. 1900.*

This is a beautiful folio volume accompanied by an album of 134 plates issued from the Construction Department of the Societa Italiana per le Strade ferrate del Mediterraneo, which is the larger one of the two great systems into which most of the railroads of Italy are gathered. This Mediterranean system has about 3,600 miles and its main office is at Milan. It is likely that chief engineers and other officers of our railroads who may wish to examine this document can procure it by addressing the Assistant Director General and Director of Maintenance and Construction, Com. Ing. G. Oliva, at Milan.

This publication describes very minutely the details of location, construction and equipment of this Italian system during the 13 years to include 1897. In general terms we may say that our railroads would not find much to imitate. Much of the work is too expensive for us, while other work is too light and too small in dimensions. The dimensions and weights of rolling stock, permanent way, superstructures and stations would not be adapted to the more important American lines. On the other hand, the permanent work is characterized by the use of much masonry, by heavy and extensive earthworks and by methods of draining such as we should never dream of. The provisions against slides made by drains and revetment walls would surprise the American officer who is more accustomed to dependence upon sleepv watchmen.

Throughout these volumes, in the descriptions and in the plates, we see the traditions of the ancient Roman builders in the substantial viaducts which cross all the valleys, many of which are subjected to the furious floods of mountain torrents. An examination of the details of these fine structures would be interesting and frequently profitable to our own engineers, and these volumes set, further, a good example in giving very full details of calculations of strength and dimensions, which may be worth the imitation of American engineers who contemplate the publication of similar monographs. Unfortunately, in this country, we are all too busy to do much of this monumental kind of work.

*Relazione sugle Studie Lavori Esequiti dal 1885 al 1897. Societa Italiana per le Strade Ferrate del Mediterraneo.

*Eighth Annual Report of the Massachusetts Highway Commission.* Austin B. Fletcher, Secretary, Boston, Mass.

Our readers are aware of the work which has been going on in Massachusetts for some years in building roads by a State Commission working with the towns and counties. The total built to the end of 1900 amounts to 296 miles, with 20 miles more on which the work is nearly finished. This is done by contract either with the town or city authorities, or with private contractors. It is found that the inexperience of the municipal officers often makes the work cost the municipality more than if it were done by an experienced contractor, but this class of loss is gradually growing less. One of the difficulties has been to get proper supervision of contracts. The larger number of the men employed for this are graduates of technical schools and they are all industrious, honest and ambitious, but naturally lack experience. Each year furnishes a larger number of qualified inspectors and each year shows that the cost of good roads diminishes.

The thickness of stone on the state-built roads varies from 4 in. to 16 in., the lesser thickness being used over good gravel or sand, and the greater over heavy clay. It is estimated that non-porous soils drained of ground water will, at their worst, support a load of about 4 lbs. per sq. in. On a stone road the downward pressure takes an angle of 45 deg. and is distributed over an area equal to the square of twice the depth of the broken stone. Assuming, therefore, the bearing power of the underlying ground the depth of the metal is computed.

It is found that trap rock is the most economical material for the surface of roads of heavy traffic. Where the cost of trap is high native stone is used as a bottom course and trap as a wearing course. All state roads are compacted by steam rollers, both during construction and permanent repairs. These give quicker, better and more economical results than any other method. With a properly prepared sub-grade and by rolling the sub-grade and each course separately no difficulty is experienced in the use of steam rollers that cannot be easily overcome. Paved gutters have not been laid since 1897, except where gullying cannot be prevented in other ways. The drainage is mostly by vitrified clay pipe laid with open joints on a 2-in. layer of fine gravel and covered and surrounded by gravel. The trench is then filled with stone. The trenches are about 3 to 3½ ft. deep and 12 to 16 in. wide.

One of the greatest advantages of the new roads is in getting better grades, and the Commission is convinced that often it will be best to lay out longer sections of state road at one time and grade these sections in advance of the gravel or macadam surface. In this way the cost may be decreased, as larger quantities may be contracted at once.

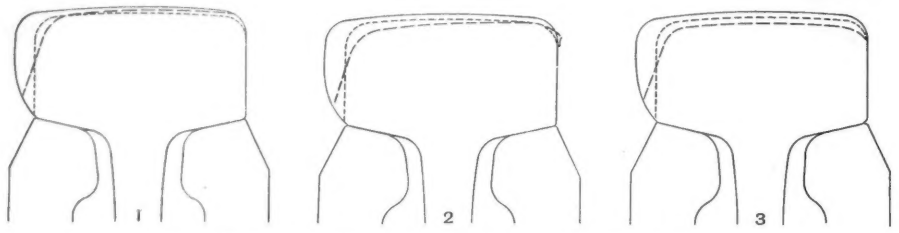
*A Catechism on the Combustion of Coal and the Prevention of Smoke.* By William E. Barr, M. E. New York: Norman W. Henley & Co. 1900. Pp. 349. Illustrated. $1.50.

The first impression made by this little fuel manual is that much valuable information has been presented in a rather unfortunate form. The defects of the method of question and answer are two-fold. The author is forced to try the difficult feat of approaching his subject from the point of view of the other man, which so far influences him as to produce a lack of natural sequence and in the end leaves many questions unanswered which might very properly have been asked; and secondly, it leads to an incorporation of matter in the answers to specific questions, which, though related to them, are not necessarily involved in a satisfactory explanation of the points raised. This renders the use of such a handbook for reference extremely difficult. It takes a man with Mr. Forney's great skill in organizing and presenting information to produce a satisfactory "catechism"; generally speaking, for purposes of study, a well-arranged treatise is far preferable, especially if the paragraphs in each chapter are set off by topical sub-headings. Even for the engineer or fireman, to whom this work is ostensibly addressed, a catchism is defective, since the tendency is to memorize answers to the questions in the book instead of mastering the principles. Accordingly he is apt to be at a loss when questions in examination are put to him in different form. It must be said, in fairness to the author, that this method of treatment was forced upon him by the publishers, who desired a book on fuels conforming in plan to a series of catechisms on technical subjects.

Coming now to the subject matter, the book as a whole deserves commendation. The several chapters deal with fuels, the physics and chemistry of the conversion of fuels into economically applicable energy, combustion and the phenomena attendant thereon, fuel analysis, heating power of fuels, steam generation, furnaces, chimneys and mechanical draft, and spontaneous combustion. The discussion of the calorific value of fuels is particularly full and lucid, as also is the explanation of the sources and conditions affecting loss of heat in the combustion of fuel in furnaces. An account of all the leading automatic stokers in the market is given, methods of applying forced and induced draft, and automatic devices for regulating the combustion of fuel and maintaining a proper temperature in furnaces. These details are all elucidated with drawings, most of which do actually elucidate.

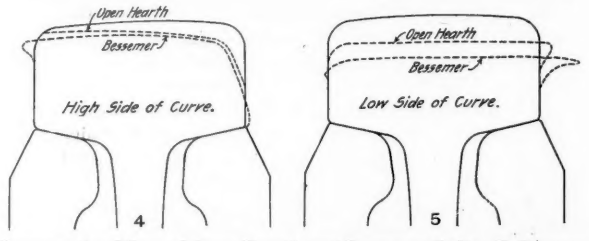
There are shortcomings in the book, however, which, though they might not seriously weigh against an aspirant for promotion in his examination paper, mar the per-

formance of one who may be regarded as a specialist in this field. For example, the analysis given as typical of Connellsville coal, is remote from the average yielded in that district. The fixed carbon rarely rises as high as 60 per cent., whereas he gives 65 per cent., and the volatile combustible would be low at 30 per cent., while he states 24 per cent. as the average. We are also disposed to object to his assertion that "to make a homogeneous good coke the fixed carbon of the coal must be of a kind that will melt at the lowest possible temperature" (p. 25). The principles on which coking depends are too complex to be stated in a few words, but this at least misses the main point by a wide margin. We must also object to the propagation of so serious a misconception as that "produces gas is a general name which covers any method of generating gas from a fuel by a process resembling distillation" (p. 175). It is to be hoped that these errors will be rectified in a second edition. We also think it would be better not to suggest the possibility of calculating the heating power of a fuel from its proximate analysis, even when given with a warning. At best such results must be in error, and usually so wide of the truth as to be misleading. The index is good, so far as it goes, but it should be greatly amplified to make the book useful as a ready-reference manual.




**Wear of Manning Improved Rail—Baltimore & Ohio Railroad.**

*Laid July, 1899, sections taken Nov. 23, 1900. No. 1—9 deg. 30 min. curve; 5 in. elev.; 4 ft. 9 in. gage; 116 ft. grade descending. No. 2—10 deg. curve; 4½ in. elev.; 4 ft. 9 in. gage; 112 ft. grade ascending. No. 3—11 deg. curve; 4½ in. elev.; 4 ft. 9¼ in. gage; 112 ft. grade ascending.*




**Comparative Wear of Open Hearth and Bessemer Rails—Baltimore & Ohio Railroad.**

*Curve, 10 deg.; elevation, 4 in.; gage, 4 ft. 8¾ in.; laid Nov., 1898; sections taken June 21, 1900; O. H. and Bessemer rails laid alternately.*

## The Manning Improved Rail.

It is not necessary to say anything to the readers of the *Railroad Gazette* as to the origin and theory of the rail section invented a few years ago by Mr. W. T. Manning. The theory of his unsymmetrical section is well known.

His first claim is the increase of life by putting more metal on the running side of the rail to provide for flange wear, but he has a second claim, also important, namely, that the rail will hold in line without tie plates or rail braces. These two points we shall consider separately.

For about two years the Baltimore & Ohio Railroad has had in service 1,000 tons of these rails, and on the 9th of this month Mr. Willard, Assistant General Manager of that road, wrote a letter to Mr. Manning saying that these rails had been in use on the outer side of curves of from six degrees to 10 degrees for from 12 to 17 months. He says that careful records have been made of the service of these rails alongside of rails of the American Society Section, and the records indicate the wear to be twice as long with the Manning improved rail. Mr. Willard says that he is sure that this is true of the Manning rail on curves sharper than six degrees; that is, the wear is twice as long before the head is cut away to such extent as to permit the wheel flange to strike the angle bar. He adds that if we assume new rail to cost $26 a ton and relayers to be worth $15 a ton anybody can calculate the economy of this longer life. Below is a calculation made by Mr. Manning.

*Comparative cost per ton in track of the Am. Soc. C. E. and the M. I. sections of rail. It has been demonstrated by actual use on 20 curves of the B. & O., ranging from 5 to 12 deg., that the M. I. section will increase the life of flange wear approximately 100 per cent.*

| | | Am. Soc. Section. | M. I. Section. |
|---|---|---|---|
| One ton of new rail | | $26.00 | $28.00 |
| Laying | | 1.80 | 1.80 |
| Interest 34 months at 6 per cent. | | 4.72 | 5.06 |
| First cost | | $32.52 | $34.86 |
| One ton new rail | $26.00 | | |
| Credit .92 tons at $15.00 | 13.80 | 12.20 | |
| Laying | | 1.80 | |
| Regauging | | | .03 |
| Interest for 17 months at 6 per cent. | | 1.19 | |
| Total net cost | | $47.71 | $34.89 |
| Saving per ton, favor M. I. section | | | $12.82 |
| Saving per 1,000 tons, favor M. I. section | | | 12,820.00 |
| Per cent. of saving | | | 26.86 |

Many sections have been taken from these Baltimore & Ohio Manning rails, and from the prints put in our hands we have selected the three shown herewith. Proofs are given with the engravings. In each case the full line shows the original Manning section, the dotted line shows the American Society section and the broken line shows the actual wear. In each case one may easily see by applying his dividers to the prints that but little life would have been left had the rail been of the American Society section, and he may also see that a long life still remains in the Manning rail. These prints carry their own lesson.

The reason why these rails will not back out of line is that the vertical component of the force tending to roll them out falls inside the center of figure, and it is perfectly obvious that the tendency to roll is thereby diminished. How great is the importance of this element in the unsymmetrical section we cannot judge so well as can the man who has had a large and detailed experience in maintenance of way. Those who have turned flange-worn rails tell us that such rails do not back out. At any rate, it seems worth while to try the Manning rail on tangents and find by actual experiment the value of this feature. The value in saving flange wear on curves seems to be demonstrated beyond question.

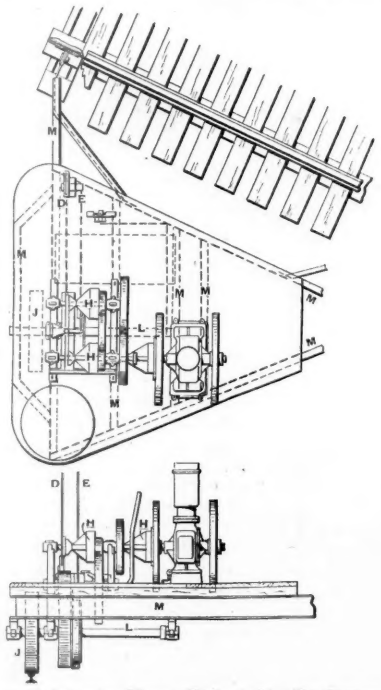
Of course one of the earliest and one of the most obvious criticisms of the Manning section was that but a small percentage of rails are taken out of the track for flange wear, but to this Mr. Manning replies that his section has its own value in the better maintenance of the line even where flange wear is not a serious element to consider. Furthermore, there are a good many pieces of line where the curves amount in length to much more than 50 per cent. of the total line. Indeed, it is not difficult to find considerable lengths of road where the curves will aggregate 75 per cent. of the total.

Another criticism that we have heard of the Manning section is that it will cause complications with frogs and switches. Whether or not this is true any man can ascertain for himself by a little work over the draughting board.

Incidentally, we give a couple of prints showing the relative wear of open hearth and Bessemer steel rails on the Baltimore & Ohio. These it will be seen are the American Society section, and have nothing to do with the Manning section. We give them now because they came to us with the same set of prints.

## Turn-table Operated by a Gasoline Engine.

The accompanying engraving shows an interesting arrangement for operating locomotive turn-tables with gasoline engines. Several tables have been equipped in this way by Fairbanks, Morse & Co., one of which was recently put in at New York city for the New York Central & Hudson River. It will be seen that the operating machinery, consisting of a vertical gasoline engine and a system of gears, is mounted on a platform M, hinged to the table and supported principally on the traction wheel J. The platform is hinged to the turn-table so that it will not be affected by the rise or fall of the table when engines pass on or off. The traction wheel travels on the circular track rail. The gearing is machine cut, and arranged with friction clutches H, and these clutches are controlled by a reverse lever D. When this lever is in the forward position one clutch is brought into play, moving the table one way; when the lever is reversed another clutch comes into play, and the table is moved in the opposite direction. The table is brought to rest by a hand-brake connected to lever E, and the brake is also useful in holding the table without the end locks. The driving shaft L is under the platform, and all the machinery is housed in. The speed at which the table operates is under the control of the operator. The engine can be started and stopped quickly, and for driving turn-tables is considered even better than an electric motor. Where the table is in an isolated place, of course, the gasoline engine has further advantages which are apparent.




**The Fairbanks-Morse Turn-table Equipment.**

## A 27-Knot Turbine Merchant Steamer.

In Glasgow, on Feb. 19, the Hon. C. A. Parson read a paper on "The Marine Steam Turbine," and gave some details of the turbine-driven vessel now building at Dumbarton for the Fairlie-Campbeltown service, which it was hoped would be ready by July 1. Her dimensions are: Length, 250 ft. x 30 ft. beam x 16 ft. 6 in. moulded to main deck and 17 ft. 9 in. moulded to promenade deck. Her general arrangements are somewhat similar to those of the usual modern type of river or coasting pleasure steamer, but slight modifications have been introduced to suit turbine machinery.

The machinery consists of three separate turbines driving three screw shafts. The high-pressure turbine is placed on the center shaft, and the two low-pressure turbines each drive one of the outer shafts. Inside the exhaust ends of each of the latter are placed the two astern turbines, which are in one of the low-pressure motors and operate by reversing the direction of rotation of the low-pressure motors and outside shafts. In ordinary going ahead the steam from the boilers is admitted to the high-pressure turbine, and after expanding about five-fold passes to the low-pressure turbines, and is again expanded in them about another twenty-five fold, and then passes to the condensers, the total expansion ratio being about 125-fold, as compared with from eight to sixteen wold usual in triple-expansion reciprocating engines.

At 20 knots the speed of revolutions of the center shaft will be 700, and of the two outer shafts 1,000 per minute. When coming alongside a jetty, or maneuvering in or out of harbor, the outer shafts only are used, and the steam is admitted by suitable valves directly into the low-pressure motors, or into the reversing motors for going ahead or astern, on each side of the vessel. The high-pressure turbine, under these circumstances, revolves idly, its steam admission valve being closed, and its connection with the low pressure turbine being also closed by non-return valves. By this arrangement great maneuvering power is obtained.

The main air pumps are compound and worked by worm gearing from the main engines in the usual way. There are also small auxiliary air pumps worked from the circulating engines for draining the condensers before starting the other auxiliary machinery, as is usual in vessels with reciprocating engines. There is a feed heater fed from the exhaust steam of the auxiliaries, and also when necessary by steam drawn from an intermediate point in the expansion of the main turbines. The boiler is of the usual double-ended Scotch pattern. The speed of the vessel is expected to surpass that of any boat at present on the Clyde.—*Engineering.*

## Some Recent Dickson Locomotives.

The Dickson Manufacturing Co. recently built in its Scranton shops six mogul freight engines for heavy and fast work on the Grand Trunk. The important features of the engines are here given:

*Grand Trunk Mogul Locomotives.*

| | |
|---|---|
| Cylinders | 20 in. x 26 in. |
| Boiler, type | Radial stay, extended wagon top |
| Boiler, diameter at smallest ring | 62 in. |
| Boiler, thickness of sheets | 7-16 in., ½ in. and ⅝ in. |
| Boiler, pressure | 200 lbs. |
| Fire-box, material | Steel |
| Fire-box, length | 120 in. |
| Fire-box, width | 40 in. |
| Fire-box, depth | Front, 77 in.; back, 65 in. |
| Fire-box, thickness of sheets, | |
| Sides, 5-16 in.; back, ⅜ in.; crown, ⅜ in.; tube sheets, ½ in. | |
| Tubes | Number, 283; diameter, 2 in.; length, 11 ft. 11 in. |
| Heating surface, fire-box | 186 sq. ft. |
| Heating surface, tubes | 1,765 sq. ft. |
| Heating surface, total | 1,951 sq. ft. |
| Grate area | 33 sq. ft. |
| Driving wheels, diameter outside | 62 in. |
| Driving wheels, diameter center | 56 in. |
| Driving axle journals | 9½ in. diameter, 12 in. long |
| Wheel base, driving | 15 ft. 8 in. |
| Wheel base, rigid | 15 ft. 8 in. |
| Weight on drivers, working order | 138,176 lbs. |
| Weight on truck | 23,800 lbs. |
| Weight of engine, total | 161,976 lbs. |
| Tender tank capacity | 5,000 U. S. gals. |

Six switching engines of the wide fire-box, six-wheel type, were also built for the D., L. & W. Railroad. These engines burn anthracite culm, and have 68 sq. ft. of grate surface. The cab is at the mid-length of the boiler. They are for the heaviest yard work, and will

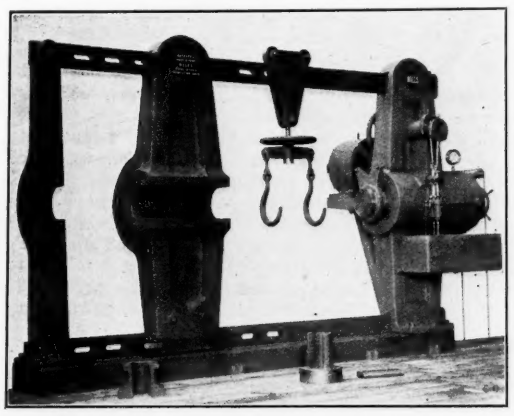
also be used as pushers. The tractive force is about 26,000 lbs. A condensed description follows:

*D., L., & W. Six-Wheel Switcher.*

| | |
|---|---|
| Cylinders | 19 in. x 24 in. |
| Boiler, type | Radial stay, straight top, wide fire-box |
| Boiler, diameter at small ring | 62 in. |
| Boiler, thickness of sheets | 9-16 in. |
| Boiler pressure | 180 lbs. |
| Fire-box, material | Steel |
| Fire-box, length | 102 in. |
| Fire-box, width | 96 in. |
| Fire-box, depth | Front, 58¼ in.; back, 49¾ in. |
| Fire-box, thickness of sheets, sides and back, ⅜ in.; crown, ⅜ in.; tube sheets, 9-16 in. | |
| Tubes | number, 270; diameter, 2 in.; length, 12 ft. |
| Heating surface, fire-box | 170 sq. ft. |
| Heating surface, tubes | 1,709 sq. ft. |
| Heating surface, total | 1,879 sq. ft. |
| Grate area | 68 sq. ft. |
| Driving wheels, diameter outside | 51 in. |
| Driving wheels, diameter centers | 44 in. |
| Driving axle journals | 8 in. diam., 11 in. long |
| Wheel base, rigid | 12 ft. |
| Weight on drivers, working order | 118,000 lbs. |
| Weight of engine, total | 118,000 lbs. |

### The Niles No. 7 Hydrostatic Wheel Press.

The accompanying illustration is from a photograph of the new No. 7 hydrostatic wheel press, made by the



A Niles Hydrostatic Wheel Press.

Niles Tool Works Co., Hamilton, Ohio. Its capacity is 300 tons and wheels 96 in. in diam. can be handled. The distance between tie bars is 100 in., and the distance between end of ram and sliding head, 9 ft. There is an opening of 12 in. in the head for axles. The machine is mounted on a base plate, but no strains are transmitted to the base as all the pressure is taken by the tie bars. The cylinder is bored true and lined with copper expanded into place and burnished. The piston is packed with best cup leather, is tight, durable and causes little friction. The pump is double acting, has two sizes of plungers and three speeds of delivery. The delivery may be instantly stopped by trip valves without shifting the belt. The ram is counterweighted for quick return. The safety valve is protected from tampering by a lock box cast on the cylinder. The pressure gage is graduated for tons of pressure and for pounds per square inch on the ram. A water tank bolted under the cylinder takes the discharge and supplies the pumps. The sliding head is supported by rollers running on planed ways on the base. Lifting hooks for shafts or the axles of wheels are suspended on rollers on the top tie bar.

The machine is substantially and accurately made throughout and is well adapted to a wide range of work.

### A Jumping Engine.

The numerous inventors who have paid good money to patent attorneys for the satisfaction of seeing patent-office drawings of their cushion arrangements for mitigating the effects of collisions on railroads will have to take a back seat; an ordinary carload of soft coal answers just as well, for all practical purposes. At any rate, the rear collision illustrated in the cut given herewith, which occurred the other day, caused no serious injury to any person on the engine or train; and the engineman did not jump off before the engine stopped. After it did stop he came down on a ladder. The train, a heavy passenger, is said to have been running about 40 miles an hour a very few seconds before it struck the freight train. The pilot and pilot deck were stripped off clean, but the boiler head was not damaged. That the engine, weighing 67 tons, did not break down the coal car by its great weight was perhaps due, in part, to the fact that the front truck of the engine was pushed under the coal car. When the engine came to rest this truck stood under its heaviest part.

Though prices have fallen in Germany and there is no longer the tremendous pressure for transportation that existed in September and October, still in the first week of 1901 the shipment of coal from the Ruhr district averaged 15,064 carloads daily, which is 19 per cent. more than in the corresponding week of last year.

### A Concrete-Iron Chimney.

The Ransome Concrete Company have just completed a chimney for the Singer Manufacturing Company at Elizabethport, N. J. The chimney is of concrete-cold-twisted iron construction, and is the second of its kind built in this country, the first having been built about

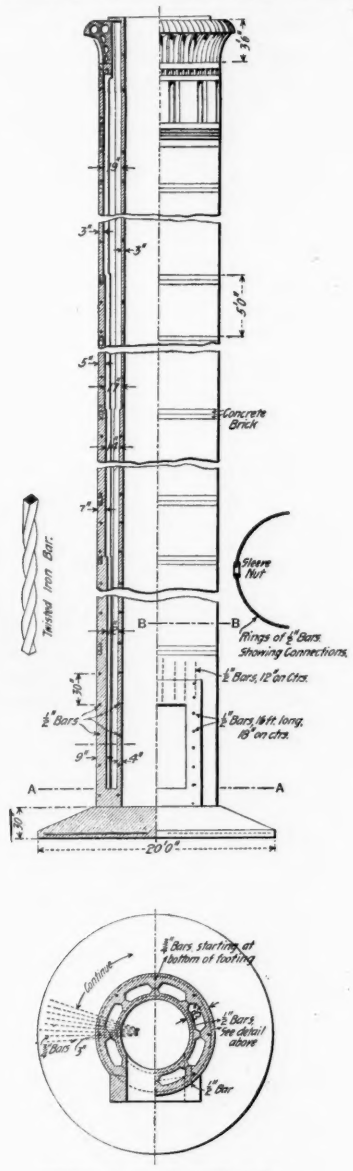



Fig. 1.—Half Section and Elevation of Concrete Chimney.

three years ago at Bayonne, N. J., for the Pacific Coast Borax Company. That chimney is 150 ft. high, with walls less than 12 in. thick, and has given perfect satisfaction, and withstood a number of severe windstorms. The Singer chimney is a straight chimney 125 ft. high with a 9-ft. flue. It weighs 256 tons, the load on the base being 9½ tons to the square foot. In designing this chimney 20 lbs. per square foot strain was allowed for wind pressure. Wet concrete was used, mixed according to the following proportions:

1 part American Portland cement.
3 parts sand.
5 parts broken Hudson River limestone.

(Stone broken to pass through a ¾-in. ring, unscreened.) All of the concrete used was machine mixed.

The method used in constructing this style of chimney is novel, and is covered by patents. In laying the foundation no piles are used. The ground is simply leveled off and the concrete laid as shown in Fig. 1. Cold twisted iron bars are imbedded in the foundation radiating from the center. Twisted rectangular bars are used in this system of construction for the reason that the spiral ribs formed upon the iron make a continuous lock between the bars and the concrete. It was also shown by tests that the tensile strength of twisted bars was considerably more than bars that were not twisted. The following table shows the increase of strength of iron bars by reason of twisting.

| Material— | No. of twists per ft. | Per ct. of gain. | No. of twists per ft. | Per ct. of gain. |
|---|---|---|---|---|
| ¾-in. sq. commercial iron | ⅝ | .03 | ¾ | .05 |
| ¾-in. sq. commercial iron | 1½ | .17 | 2¼ | .18 |
| ¾-in. sq. commercial iron | 3¾ | .20 | 6 | .24 |
| ¾-in. Norway iron | 6 | .52 | 6 | .53 |

After the foundation is set a mold constructed as shown in Fig. 2 is put in place and the actual building of the chimney commences. The mold is filled with concrete which has iron bars imbedded in it placed as shown

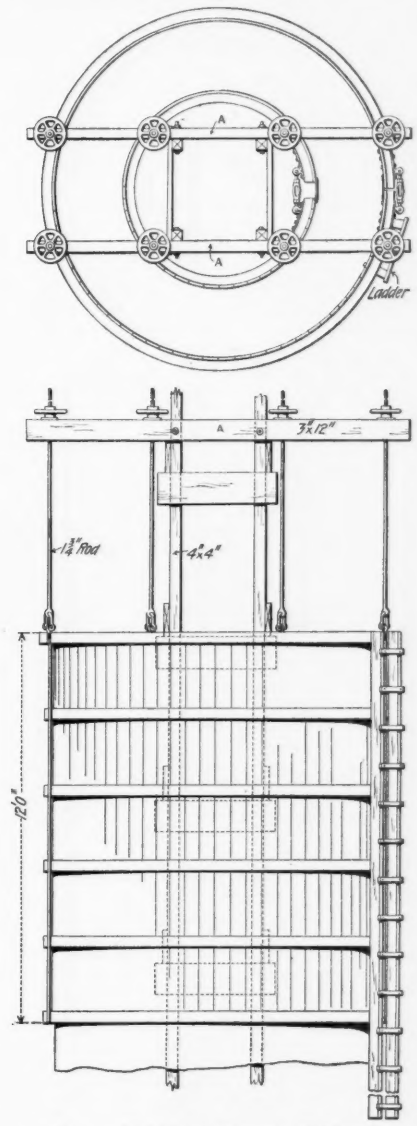



Fig. 2.—Mould for Concrete Chimney.

in Fig. 1, the inner and outer shells being formed, by coreing, as shown in the section. This concrete is then thoroughly tamped and allowed to set. Scaffolding is then erected inside and outside of the mold; on this scaffolding the beams A shown in Fig. 2 are supported. After the first filling of concrete in the mold is thoroughly set, the turn buckles on the mold are let out, leaving the mold free to be raised by means of the threaded stays and hand wheels. Eight men are required to raise the mold, one man at each wheel. The mold is raised 5 ft. at a time; this leaving the mold a lap of 7 ft. on the portion of the chimney already set. The mold is now tightened up by means of the turn buckles, and is again filled with concrete and iron rings. Perpendicular iron rods are also placed through the chimney as shown in Fig. 1. These are joined at every filling, making a series of continuous bars from the base to the top of the chimney. This operation is continued each succeeding day, the scaffolding being extended upward, and the mold raised, filled and allowed to set, thus 5 ft. of the chimney is completed each day. When the mold is raised high enough to clear the cleaning out door the concrete is delivered to the men on the scaffold by means of a bucket hoist inside of the mold. A plaster mold is used to mold the cap. When lightning rods are desired the perpendicular iron rods already referred to are extended up through the cap. The outside of the chimney may be left plain, or tooled to represent stone; sometimes two rows of concrete brick are laid in place after each day's work, making a series of brick rings 5 ft. apart throughout the height of the chimney. Two more of these chimneys are about to be erected in South Bend, Ind.

R. C. D.

### A Boiler Explosion From Low Water.

Whenever a boiler explodes the public concludes that the cause was low water. Usually the fireman is blamed for it, especially if the poor fellow was killed; but this particular corollary of the theory is not essential. The one thing that everybody is certain of is that the water was low and the plates red-hot, and that somebody then proceeded to pump in some cold feed water. The first

gush of feed water that struck the hot plate is supposed to have instantly passed into steam, causing an enormous increase in pressure, and bursting the boiler. This theory is simple enough to satisfy any one, and it can be understood by anybody. For these reasons, we suppose, it has fastened itself on the public so securely that they will have nothing else, and any attempt to explain the explosion in any other way is regarded with disfavor. It may be that there is evidence that plenty of water was present, and that the line of fracture passed through a serious and obvious defect in the material, or through an area where the plate was dangerously thinned by corrosion; and yet it is hard to make the average citizen believe that low water did not figure in the catastrophe.

We have said a good deal against this low water theory, which appears to hold all inexperienced persons in its grip, and we have published illustrated accounts of many explosions which were certainly not due to low water; and we have tried to show that although low water certainly does produce explosions, there are a hundred other causes that must also be considered.

This month (January) we show the results of a boiler explosion in the South, which undoubtedly was due to low water. The boiler gave way on the sheet exposed to the fire, below the horizontal joint. The redness of the plates gave abundant evidence that the water had been low. We do not think, however, that the theory of a sudden generation of large quantities of steam from the flooding of the hot plate is likely to be true. It is far more likely that the heat to which the plate was exposed, damaged the material to such an extent that it no longer possessed the tensile strength to resist the stress to which it was subjected by the ordinary steam pressure; and we have an idea that the boiler would have exploded just the same, whether the feed valve was open or not.

The boiler was 60 in. in diam., with 80 18-ft. tubes, and a dome 36 in. in diam. and 36 in. high. The steel of which it was constructed varied in thickness, along the line of fracture, from 0.305 to 0.324 in. The longitudinal joints were double riveted, the rivets being driven in $^{13}/_{16}$-in. holes, pitched 2½ in. from center to center. The break occurred about 12 in. below one of the horizontal joints, and the escaping steam blew down the settings, destroyed the boilerhouse, injured two men, and overturned three iron stacks, besides seriously damaging two others. The boiler was bought at the U. S. Navy Yard, at Norfolk, Va., and had seen but little service. It was believed to be in excellent condition prior to the explosion.—*The Locomotive.*

## TECHNICAL.

### Manufacturing and Business.

The Keuffel & Esser Co., New York, has opened a branch store in San Francisco, Cal., at 303 Montgomery street.

In new orders for locomotives on the International & Great Northern Railroad the Falls Hollow staybolt iron has been specified. Mr. Hufsmith, Superintendent of Motive Power and Rolling Stock, was convinced by the tests and records that this gives him the best results, and consequently is the cheapest.

S. Whinery, M. Am. Soc. C. E., has opened an office as Consulting Engineer at 95 Liberty street, New York city. He is prepared to take up municipal work, and especially street paving, also expert examination of railroad projects, water power development and the development of industrial enterprises in general.

The Powers Regulator Co. has recently installed their device on eight cars of the Canada Atlantic, two trains of the Grand Trunk and several cars on the Intercolonial Railway in Canada. The Chicago North Western have added quite a number of cars to their equipment, and orders have recently been received to equip cars on the Lake, Shore, Delaware, Lackawanna & Western, Delaware & Hudson, Rio Grande Western and other railroads.

The Boston & Lockport Block Co., Boston, Mass., at its annual meeting at Lockport, N. Y., last week, reelected the following directors: Albert D. Bosson, Frank Gebbie, Myron H. Tarbox and Adelaide C. Beverly. The officers elected for the ensuing year are: President, Albert D. Bosson, Boston; Vice-President, Frank Gebbie, St. Johnsville, N. Y.; Secretary and Treasurer, Myron H. Tarbox, Boston; Assistant Secretary, Alfred B. Tarbox, Boston. The report of the Treasurer showed a very satisfactory business for 1900, and according to the present outlook the year 1901 will show a decided increase over 1900.

### Iron and Steel.

The Shelby Steel Tube Co. will soon move its main office to New York city.

The Anniston Rolling Mill Co. of Anniston, Ala., is adding a new mill to its plant, and proposes to make bar iron and small sections of T-rails, angles, channels, etc.

The Central Iron & Steel Co., capitalized at $750,000, was incorporated in New Jersey, March 5, to make iron and steel. The incorporators are: J. Milton Perry, Herbert Taylor and Harry E. Tyler, all of Jersey City, N. J.

The Republic Iron & Steel Co., according to report, will establish a rail mill at Haselton (Youngstown, Ohio) on a site occupied by the Haselton mill, formerly operated by the Andrews Bros. Co., and now idle. Plans for the new mill are reported being made by S. V. Huber & Co., Engineers, of Pittsburgh.

The Andover Iron Co., of Phillipsburg, N. J., whose furnaces have been in constant blast since 1848, is to be dissolved. Joseph Wharton, of Philadelphia, has bought the entire capital stock and will continue the works. The furnaces are now idle, pending improvements, which will double their capacity.

The Pacific Steel Co., with an authorized capital of $1,000,000, has been formed by capitalists of McKeesport, Pa., to build a plant on the Pacific coast, probably at Port Townsend, Wash. Among those interested are Homer H. Swaney, J. C. Smith, Frederick Crabtree, Horace C. Reed and others.

The Griffing Uniform Steel Co. was incorporated in New Jersey March 5, to buy and sell metals, castings, mechanical devices, and machinery of all kinds. The office is in Passaic. The capital stock is $60,000, and the incorporators are: Solomon M. Schatzken, Passaic; A. A. Griffing, of the Equitable Building, New York; George Bastable, Brooklyn, N. Y., and A. E. Williamson, of Passaic.

### New Ferryboat for the West Shore Service.

The New York Central & Hudson River Railroad put in regular service Sunday, March 10, a new double deck ferryboat to run between Weehawken and Franklin street, New York, for the West Shore service. This craft is named the "West Point." Certain particulars follow:

Steel hull built by T. S. Marvel & Co., Newburgh, N. Y.; length between perpendiculars, 178 ft.; length over all, 208 ft.; breadth molded, 40 ft.; breadth over all, 66 ft.; depth molded amidships at side, 18 ft. Machinery built by W. & A. Fletcher Co., Hoboken, N. J. Double compound engine, with two high-pressure cylinders, 18 in. diameter, and two low-pressure cylinders, 38 in. diameter, all having a piston stroke of 28 in. Cylinders all have piston valves, with Stephenson double-bar links and valve gear. Engines connected together on line shafting extending entire length of boat, with steel propeller wheel at each end. Air pump and jet condenser of the Blake vertical twin type, with steam cylinders 12 in. diameter, and air cylinders 25 in. diameter, and piston stroke 18 in. Also Blake fire and feed pumps.

Two Scotch boilers, 12 ft. 9 in. diameter and 12 ft. long, each containing three Morrison corrugated furnaces. Boilers and engines built for a working pressure of 140 lbs. per square inch.

Electric Light Plant.—Two engines and two dynamos made by the General Electric Company of 250 lights capacity, all to be installed by the Western Electric Company.

Heating Plant.—Made by B. F. Sturtevant Company, with large steam heaters in hold and blower to furnish fresh hot or cold air to all of the cabins.

The boat has the usual wagon ways and cabins for men and women on the main deck, with a general saloon on the upper deck. The saloons are all very commodious and elegant, fitted with cherry stairway, panels, pilasters and seats. The decorations were designed and made by Mr. Samuel Huckel, Jr., the architect, and Mr. Prentice Treadwell, the decorator of the new Grand Central Station.

### New York Central Improvements in Utica.

Officers of the New York Central & Hudson River recently held a conference with the Mayor of the City of Utica and members of the Mohawk River Straightening Commission, to consider the proposed new depot and freight house, and elimination of the grade crossings in Utica, and straightening the river. The new buildings will cost about $250,000. The contract to straighten the Mohawk River was let on March 11 to the T. H. Riddle Construction Co., of Palatine Bridge, N. Y., at $130,937. The city will issue bonds.

### Non-Inflammable Rubber Tubing.

Consul Hughes, of Coburg, Germany, reports that Müller & Korte, of Pankow, near Berlin, have brought out a new kind of rubber tubing. The tube is sheathed with asbestos and the asbestos coated with incombustible paint. The tubing remains pliable, and can be cut as before. Burners with such rubber tubes may be placed on sand baths or hot stoves. The protection is, of course, not absolute, for when the heat becomes too strong the rubber inside will give away.

### A New Alloy.

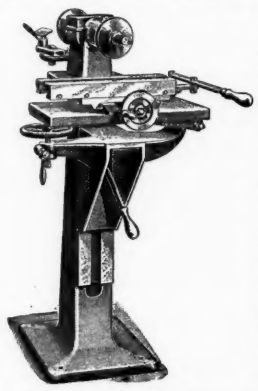
Consul Albert, writing from Brunswick, Germany, tells of magnalium, a new alloy of aluminum and magnesium, with a percentage of from 2 to 30 per cent. of the latter metal. Magnalium, it is said, is free from the bad qualities of aluminum, while it retains its light weight, firmness and tenacity. It is especially applicable in the automobile industry, in electro-technics and other arts. It can be worked with the file, lathe and planing machine; it is also admirable as a solder. It is weatherproof and does not rust.

### Round House Heating and Ventilation.

We lately published a description of the Sturtevant heating and ventilating of the roundhouse of the Chicago & North Western at Clinton, Iowa. Regarding a similar arrangement in the roundhouse of the same road at Mason City, Iowa, the Master Mechanic writes that "the engine house at Mason City is heated the same as the one at Clinton, and we are very much pleased with the arrangement. While this has been a very open winter, still on two or three occasions the thermometer has registered 12 below, and at no time have we found it necessary to run the engine at its full capacity. Engines coming from the road covered with ice and snow are quickly thawed, and inside of one hour are ready for service. As a rule, in this country, during the winter season, where engine houses are heated with steam, it is impossible to see 10 ft. ahead of you. At no time during the winter have we noticed anything of this nature."

### A Combined Surface Grinder and Grinder-Head.

This machine, made by the Diamond Machine Co., Providence, R. I., is very convenient for grinding gibs, dies, keys, or similar work, and for finishing many of the flat surfaces ground in tool rooms. The spindle is arranged for two wheels and a rest of the kind common on grinder heads is provided for use in connection with the wheel in the back of the machine so that this machine is also suitable for grinding small tools. The knee is counterbalanced so that it may be easily raised or lowered, and when the table has been set approximately, by clamping the knee, a fine adjustment through a distance of 1½ in. may be obtained by means of the hand wheel shown at the left in the cut. The table is passed lengthwise beneath the wheel by the hand lever at the right, or transversly by the small hand wheel in the front of the cut, and the levers and hand wheel shown are conveniently reached at all times by the person operating the machine. The table is 14 in. long, 6 in. wide and has a T-slot. The bearings are ample; are lined with anti-friction metal, and furnished with ring oilers. Provision is made for protecting the bearings from dust and dirt, and for taking the end thrust of the spindle. The machine uses wheels 12 in. in diameter, 2 in. face and 1 in. hole.



### The Alabama.

The U. S. battleship "Alabama," a sister ship to the "Illinois," had her final trial March 11 to 13 off Pensacola, Fla. Rear Admiral Evans, President of the Trial Board, has reported to the Navy Department that on March 11 she had a full power trial under natural draft, using Virginia coal, and that both main and auxiliary machinery worked satisfactorily, except for a few leaky stuffing boxes. She made 15.2 knots, and developed 7,506 h.p. The big turret guns were fired with smokeless powder, and her battery thoroughly tested, only some small defects in adjustment being shown. The Board sums up its report by saying that the trial developed no weakness or defect in hull or machinery; that the ship is well built of good materials and shows no weakness or failure. The "Alabama" was built by Cramp & Sons, Philadelphia, and has a displacement of 11,565 tons, 11,366 i.h.p. and a main battery of 11 guns.

### The Potomac River Channel.

The contract for completing the 20-ft. channel 400 ft. wide in the Potomac River above the mouth of the Anacostia River at Washington, D. C., which was nullified last year, has again been let, and the work of dredging will begin at once. At a cost of $80,000, 70,000 cu. yds. of material will be removed and deposited on Potomac Park to fill in and raise the level of the park to the required height. During the coming fiscal year the work of completing a 24-ft. channel 200 ft. wide below Washington, for which $98,000 was appropriated by the Sundry Civil bill, as noted last week, will probably be completed.

### Green for All-Clear on the Southern Pacific.

A press despatch from San Francisco says that the Southern Pacific will at once adopt green for the all-clear indication in all of its signal and switch lights.

### Electrifying the London Underground.

Press despatches say that the directors of the Metropolitan and the Metropolitan District (underground) railroads of London have decided to adopt the Ganz system with the Sprague multiple unit control. We have not had confirmation of this from official sources.

### The Vanderbilt Boiler.

A ten-wheel locomotive with the Vanderbilt boiler is building for the Illinois Central Railroad. This will be shown at the Pan-American Exhibition. A tender with Mr. Vanderbilt's steel underframe will be built for this engine and also exhibited.

## THE SCRAP HEAP.

### Traffic Notes.

The Presidents of the railroads west of Chicago are to meet in New York city April 3 to consider the freight rate situation.

The special fast passenger trains between northern cities and Florida are to be kept running this year until April 26, though after April 8 trips will be made only three times a week each way.

The Passenger Committee of the Trunk Line Association finds that during the month of February the number of through tickets sold from Buffalo to New York was about 7,000, which is much larger than usual.

On April 1 there will be made an increase of 10 cents a ton in the freight charge on bituminous coal carried

to tidewater from all of the mines in Pennsylvania, Virginia and West Virginia. The advance appears to have been agreed upon by the Pennsylvania, the Baltimore & Ohio, the Chesapeake & Ohio and the Norfolk & Western.

An agent of the Interstate Commerce Commission went to Kansas City last week and, through Deputy United States Marshals, summoned a number of freight agents to appear at an inquiry to be held March 25 concerning the notorious irregularities in rates on freight eastward from that city. The reporters say that a good many of the agents made a wild scramble to get out of town before the marshals should find them; ten got away and five hid in a room in a hotel all day, and then went out of town in a hack.

### The "Jig Habit" in America.

Wherever possible, the American has applied to the production of manufactured articles the system of interchanging parts, and the using of special tools. Such contriving and using of special tools as practiced by the Yankee may be termed the "jig habit." This, of course, does not refer to the using alone of the tools technically called "jigs," but also to the many analogous devices which embody the grand principle of cheap multiplication of similar pieces by reason of the existence of a masterpiece of some kind, upon which all the ingenuity, original thought, and expense necessary to perfect it have been lavished. The idea is exemplified in making coins, and in stamping many articles from sheet metal, the original dies being expensive and highly developed, but capable of producing millions of pieces, all alike, without further exercise of intellectual or artistic power. The same general conception is again seen in the elaborate tools which are mounted upon turret lathes, where one careful adjusting answers for all the screws or rods which are to be made of a certain kind, without high mechanical skill being applied to the production of each, as in the old-time methods. Still more is this principle shown in the using of jigs, cradles and gages for locating and keeping accurate all the holes and other finished surfaces in various pieces of wood or metal.—*Oberlin Smith, in Cassier's Magazine.*

### Electric Locomotives for Baden.

The administration of the Badische Local Eisenbahn Gesellschaft is introducing electric traction on its line. Several electric locomotives have already been ordered from the Union Company of Berlin, and the results thus far attained are said to be very satisfactory. The electric engines draw twelve passenger cars. A number of additional electric locomotives will soon be ordered. The entire line between the cities of Karlsruhe and Ettlingen is to be changed into an electric line. The headquarters of the company are at Karlsruhe, Baden.

### Railroad Time in Spain.

Consul-General Lay, of Barcelona, transmits copy of a Spanish royal decree fixing the official time on all Spanish railroads, after Jan. 1, 1901, according to Greenwich meridian, instead of that of Madrid, as heretofore. The decree also designates the hours from noon until midnight by the numbers 13 to 24, and all timetables and railroad clocks have been changed accordingly.

### Trade With the Commonwealth of Australia.

The Commonwealth of Australia was formally inaugurated at Sydney Jan. 1, and the first Commonwealth Ministry has assumed office. The most important characteristic of the Ministry is that it is a professed protectionist one. For free traders, no place has been found. Mr. G. H. Reid, the ablest and most far-seeing statesman in Australia, to whose practical sagacity the accomplishment of federation is more due than to the orators, has been studiously ignored. Some negotiations were conducted with Mr. Holder, the free trade Premier and Treasurer of South Australia, but they were hardly intended to be in earnest, and he also has been left out in the cold. Yet he is probably the best Treasurer now in office in Australia. The Provisional Ministry is bound then to stand or fall upon the fiscal issue, and a struggle between the forces of protection and free trade is imminent in connection with the election of the first Parliament. It is impossible to say how the contest will end. The question is not purely and simply a fiscal one; there are two very opposite but very important factors to take into account. The one is a disinclination shown in the other "States" to favor the adoption of a high protective tariff, which would especially benefit Victoria largely at their expense. The second is a strong desire for compromise between the fiscal systems of the six states. The spirit of compromise is being sedulously preached up.—*The Economist.*

### Improvements on the Pennsylvania Railroad.

The recently issued report of the Pennsylvania for the calendar year 1900 contains the following statement as to proposed new work:

The demands of your traffic will necessitate a large outlay during the current year. In addition to the Pittsburgh station, the elevation of the tracks, and the reconstruction of your passenger terminals at that point, like expenditure will be required at other important points on your lines to avoid grade crossings and facilitate the movement of traffic. Under the arrangements just concluded with the municipal authorities of Newark, your tracks will be elevated through that city and grade crossings abolished, which are a constant menace to the safety of your trains. The situation at New Brunswick, in the same State, will also require similar treatment, although at less cost, while at Trenton it will be necessary to construct a new bridge over the Delaware River, to secure proper alignment at that point. Toward these expenditures the sum of $3,000,000 has been set aside out of the income of the year and out of the profit realized from the sale of securities. A new and commodious passenger station is also much needed at Camden, to accommodate the heavy travel to and from the seashore and the local territory tributary to your Amboy division, and work thereon is now in progress.

On the line between Philadelphia and Washington, it will be necessary to elevate the passenger tracks in Chester and Wilmington, and increase the freight facilities at the latter point, while under legislation recently enacted by Congress, your line through Washington must be so revised as to avoid grade crossings of the public highways, your passenger station rebuilt, and a new bridge erected over the Potomac River. On the main line the time has arrived when it is necessary to push forward vigorously the competition of your four-track system. Considerable expenditure will be required for additional terminal facilities at various points, and for real estate, power and equipment.

### Public Improvements at Washington, D. C.

The District of Columbia appropriation bill, as finally passed by Congress, appropriates $500,000 to continue work, during the next fiscal year, on a filtration plant for Washington. For the completion of the Washington aqueduct tunnel and the Howard University reservoir $162,000 was allowed. For a sewage disposal pumping station $375,000 was appropriated, beside over $340,000 for new sewers. The bill to permit the laying of a single track for electric railroad across the Aqueduct bridge failed to pass.

### Technical Schools.

*Rensselaer Polytechnic Institute.*—H. de B. Parsons, M. Am. Soc. C. E., of New York city, delivered a lecture before the students of the Rensselaer Polytechnic Institute at Troy, N. Y., on March 14 on "The Effect of Fire on Modern Buildings."

*University of Illinois.*—The following is a partial list of non-resident lectures to be delivered under the arrangements made by the Mechanical and Electrical Engineering Society:

March 22.—The Handling of Materials by Means of Endless Elevators and Conveyors, by J. V. Schaeffer, Link Belt Manufacturing Company.
April 2.—From Mine to Furnace, by Mr. John Birkinbine.
April 10.—Steam Boiler Efficiency, by Mr. William Kent.
April 17.—Recent Development in Central Station Electrical Supplies, by Mr. W. L. Abbott, Chicago Edison Co.
April 24.—Design, Manufacture and Use of Transformers, by W. A. Layman, Wagner Electrical Manufacturing Co.
May 8.—Central Power Station Design, by Bion J. Arnold.
May 15.—Locomotives at Paris Exposition, by Professor Breckenridge.

### I. C. C. Decision on Rates for Missouri Coal.

The Interstate Commerce Commission has issued a report on the complaint of McGrew versus the Missouri Pacific, concerning freight rates on coal from Myrick and Rich Hill, Mo., to Kansas City and points farther west. The claim that these rates were inherently unreasonable is not sustained. Myrick is 43 miles west of Rich Hill and the claim for a differential below the Rich Hill rate is partly sustained; there should be one of 10 cents to the nearest zone and of 5 cents beyond. The mines at Rich Hill are owned by the railroad, and it was contended that as the coal found here is less valuable than that at Myrick the road should be allowed to make a lower freight rate in order to sell it. The Commission finds that the difference in value is not so great as claimed; and, moreover, if differentials are to be allowed, Myrick can also claim one because the cost of mining is higher there. The summary of the decision says, further:

"The defendant railway company, owning most of the mines upon its system, is engaged both in mining and transporting coal to market, and it is a matter of entire indifference to it whether a profit accrues from the mining or from the transportation; it may so adjust its rates that the mining of its coal will be conducted at a loss, the profit being derived from the carriage, and in that event every coal operator upon its line paying such rates must do business at a loss. *Held*, That the only remedy available in such case to the independent operator is to secure to him a reasonable rate.

"It is true that the remedy by way of damages for unlawful rates is utterly inadequate and inconsistent, but it is apparently the remedy prescribed by the Act to Regulate Commerce, and the only remedy which the shipper has against the exaction of an unreasonable interstate rate."

## LOCOMOTIVE BUILDING.

*The Toledo & Ohio Central* is in the market for three locomotives.

*The Fort Worth & Rio Grande* is in the market for locomotives.

*The Chicago & Western Indiana*, it is reported, will buy two locomotives.

*The Illinois Central* is having one engine built by the Baldwin Locomtive Works.

*The Canada Atlantic* is having one engine built by the Baldwin Locomotive Works.

*The Pennsylvania* will build 27 Class E-2 passenger locomotives at its Juniata shops.

*The New Zealand Government Railroads* have ordered one engine from the Brooks Locomotive Works.

*The Long Island* order with the Baldwin Locomotive Works, referred to March 8, calls for five engines.

*The Great Northern of Canada* has ordered four engines from the Cooke Locomotive & Machine Works.

*The Louisville & Nashville* has ordered 10 consolidation locomotives from the Cooke Locomotive & Machine Works.

*The Great Northern* has prepared specifications, which are now in the hands of the builders, for about 50 locomotives.

*The Grand Trunk* is preparing to build, at its Point St. Charles shops, eight 10-wheel passenger engines, two 20 x 26-in. mogul freight engines, and 12 2-cylinder compound mogul freight engines. The latter will have 22½-in. and 35-in. x 26-in. cylinders, arranged according to the Richmond system of compounding.

*The Plant System* has been asking bids on five engines and has ordered three 6-wheel switchers from the Richmond Locomotive Works. The switching engines will have 18-in. x 26-in. cylinders; 50-in. driving wheels; fireboxes 41 in. long and 96 in. wide; boilers, radial stay, 60 in. in diam., with a working steam pressure of 180 lbs., and 250 tubes 2 in. in diam. and 12 ft. long; and will weigh in working order about 108,000 lbs. The tank will have a capacity for 4,000 gals of water.

*The Kanawha & Michigan* order with the Baldwin Locomotive Works for five consolidation engines, referred to last week, calls for engines to weigh 150,000 lbs., with 134,000 lbs. on the driving wheels and to have 20-in. x 26-in. cylinders; 54-in. driving wheels; straight top boilers, with a working steam pressure of 180 lbs.; fire-boxes, 108 in. long and 42 in. wide and a tank capacity for 4,000 gals. of water. The specifications include Westinghouse brakes, Sterlingworth brake-beams, Tower couplers, Sellers injectors, U. S. Metallic piston and valve rod packings, Crosby safety valves, Houston sanding devices, Detroit lubricators, Standard tires, U. S. staybolt iron, Keasbey & Mattison lagging and Damascus bronze brasses.

## CAR BUILDING.

*The Green Bay & Western* may soon be in the market for box cars.

*The Lectonia* has ordered four freight cars from the Pressed Steel Car Co.

*The Chesapeake & Ohio* is asking bids on 250 coal cars of 80,000 lbs. capacity.

*The Pennsylvania* will build 500 gondola cars of 80,000 lbs. capacity at its Altoona shops.

*The Springfield, Dayton & Urbana* is in the market for about 15 cars for passenger service.

*The Indiana, Illinois & Iowa*, it is reported, will soon be in the market for some steel cars.

*The St. Lawrence & Adirondack* has ordered two coaches from the Jackson & Sharp Co.

*The Portland & Rumford Falls* is having one passenger car built by the Jackson & Sharp Co.

*The Arizona & Southeastern* is having four passenger cars built by the Barney & Smith Car Co.

*The Philadelphia & Reading* is in the market for 1,000 hopper bottom cars of 100,000 lbs. capacity.

*The Southern Indiana* has ordered two cars for passenger service from the Barney & Smith Car Co.

*The Shawnee, Oklahoma & Indian Territory*, it is reported, will soon be in the market for a few ballast cars.

*The Cleveland, Cincinnati, Chicago & St. Louis* has ordered 40 cars for passenger service from the Barney & Smith Car Co.

*The Indiana, Illinois & Iowa* order with the American Car & Foundry Co. for 500 gondola cars of 80,000 lbs. capacity has been reduced to 250 cars of the same class.

*The Choctaw, Oklahoma & Gulf* has ordered 250 coal cars from the American Car & Foundry Co., and has increased its order with the Southern Car & Foundry Co. by 500 coal cars, making in all 1,000 cars ordered from the latter works.

*The Chicago Great Western* order with the American Car & Foundry Co. for 70 flatcars of 70,000 lbs. capacity, calls for May 1 delivery. They will weigh about 25,000 lbs. and measure 40 ft. long and 9 ft. 3 in. wide. The specifications include Sterlingworth brake-beams, Westinghouse brakes, Miner draft rigging and Barber trucks.

## BRIDGE BUILDING.

ANCHORAGE, KY.—The Louisville, Anchorage & Pewee Valley Electric Ry., according to report, will soon want estimates for its proposed bridge. R. M. Hudson, Engineer, Cloverport, Ky.

ATLANTA, GA.—It is proposed to build an extension to the Whitehall street viaduct.

BAYVILLE, N. Y.—It is stated that the Town Board is considering plans for a 520-ft. drawbridge to cost about $24,000.

BELLEVILLE, ONT.—A bridge is proposed on the north boundary line, but it will not be built this year.

BERLIN, ONT.—Tenders will be received by the Clerk of the Township of Woolwich for a 175-ft., single-span steel bridge over Conestogo River at St. Jacobs. Plans may be seen at the office of Herbert J. Bowman, this place.

BETHLEHEM, PA.—The middle span of the bridge over Monocacy Creek was carried away by high water March 15, causing a loss of about $10,000.

BOSTON, MASS.—Superintendent Wheeler of the Street Department opened the following bids, on March 14, for a steel bridge on Columbia Road over the New York, New Haven & Hartford, and for the bridge on Columbia Road on Shoreham street: Dean Westbrook Bridge Co., New York, $24,800; Canton Bridge Co., $21,500; Berlin Construction Co., Berlin, Conn., $19,777; Easton Bridge & Structural Co., Worcester, $21 000; American Bridge Co., $17,532; Eastman, Lovell & Co., Boston, $20,000; H. C. Collins, Springfield, Mass., $19,900; King Bridge Co., Cleveland, $19,754; The North Penn Iron Co., Philadelphia, $31,850; G. P. Bullard, West Newton, $21,700; The Toledo Bridge Co., Toledo, $21,250; New England Structural Co., Boston, $19,000; Boston Bridge Works, Boston, $18,579.

BRADFORD, PA.—Bids are wanted, March 25, for the three steel highway bridges. P. R. Winfree, City Engineer.

BRIDGEPORT, CONN.—An officer is reported as saying that work will soon be begun on the eastern portion of the extensive four-track work, which includes a Scherzer rolling lift bridge over the river.

BRISTOL, TENN.—We are told that Dr. Hix, Chairman of the Street Committee, will receive bids when the time is set for the two steel bridges proposed over Beaver Creek, one at Washington street and the other at William street. John C. Anderson, Mayor.

CHATHAM, ONT.—Tenders are being received by J. C. Fleming, Clerk County of Kent, for a steel trestle 130 ft. in length, being an approach to a bridge across the River Thames at Kent bridge, four spans.

CINCINNATI, OHIO.—The Board of Public Service is considering the advisability of building a viaduct on St. Clair street between Eden and Euclid avenues. It will be about 450 ft. long. Robert Allison, President of the Board.

CONNEAUT, OHIO.—Estimates are reported made by C. F. Lewis, of Cleveland, Ohio, for a bridge at Conneaut, which includes five plans, the prices ranging from $116,666 to $195,181. The bridge will be built by the county.

DAYTON, OHIO.—The Council is considering the request of property owners in Riverdale and North Dayton for a bridge across the Miami River at Cannon street.

DUBLIN, GA.—The County Commissioners, according to report, propose to build a 1,000-ft. steel extension to the Oconee bridge.

EL PASO, TEX.—A bridge to cost about $20,000 is proposed over the Rio Grande River.

FLINT, MICH.—Montrose Township will issue $10,000 of bonds for a bridge over Flint River.

FORT DODGE, IOWA.—The City Council is reported to have approved plans made by the Stark Bridge Co., of Des Moines for a viaduct over railroad tracks.

FREDERICTON, N. B.—Chief Commissioner of Public Works is receiving bids for a number of bridges.

FREEPORT, ILL.—Bids are wanted, March 27, for a 215-ft. steel bridge, 64 ft. wide, to be of two or three spans and cost about $20,000.

GRAND RAPIDS, MICH.—The bids received, on March 8, for the Bridge street bridges were: Grand Rapids Bridge Co., a Melan arch bridge, $31,286; Thatcher, $30,286; Hoosier Bridge Co., Indianapolis, Ind., $29,989.

HARRISBURG, PA.—An ordinance making an appropria-

tion for repairs to the Mulberry street bridge has passed the Council.

HUNTSVILLE, ONT.—The Provincial Government is asked to appropriate $10,000 toward a bridge over the Muskoka River.

INDIANAPOLIS, IND.—The American Bridge Co. has the contract for the Raymond street bridge over White River at $17,770. The bridge over Fall Creek, on Germantown Pike, will be built by the Toledo Bridge Co., at $15,725.

LAMPASAS, TEX.—D. C. Thomas, County Judge, wants bids, until April 16, with plans, specifications, etc., for two iron or steel bridges across the Colorado River, one at or near the Red Bluff crossing, and the other at or near the Cowell crossing between Lampasas and San Saba Counties.

LANCASTER, PA.—Bids are wanted, April 4, for a stone arch bridge; also estimates on two wrought iron or steel bridges at the same place in Euphrate Township. David E. Mayer, Chairman County Commissioners.

MARSVILLE, ONT.—Robert Cooper, County Clerk, is receiving tenders for two steel bridges across the Welland River, in the County of Welland, about seven miles from the town of Welland. Length about 135 and 155 ft. respectively, in one span, 16 ft. roadway.

MERINTON, ONT.—Tenders are being received by R. Clark, Village Clerk, for a bridge over the raceway near the Lincoln paper mill.

MIAMI, IND. T.—W. E. Rowsey and Dr. McWilliams, of Miami, have a franchise to build a toll bridge across the Neosho River from Miami.

MILWAUKEE, WIS.—Bids are wanted, until April 26, by the Board of Public Works for a highway bridge over the Milwaukee River from Grand avenue to Wisconsin street, commonly known as Grand Avenue bridge. Chas. J. Poetsch, Commissioner of Public Works.

NEW CASTLE, PA.—Viewers have reported favorably for a bridge over Davidson Run near the village of Darlington.

NEW LONDON, CONN.—The Central Vermont will make extensive improvements, which include replacing 26 wooden bridges with steel bridges.

NEWTON, N. C.—The County Commissioners will build a steel bridge across the South Fork River.

NILES, MICH.—It is reported that the Secretary of War has approved the plans for two drawbridges across the Paw Paw River.

PITTSBURGH, PA.—F. M. Ashmead, Engineer of the Buffalo & Allegheny Valley division of the Pennsylvania, has made plans for rebuilding the bridges along the Low Grade division. The American Bridge Co. will build 50 steel bridges to replace wooden structures. The bridges are between Driftwood and Red Bank, and they will vary in length from 50 to 350 ft.

PITTSFIELD, MASS.—The City Council has been petitioned for a bridge over the Boston & Albany tracks at Dalton avenue.

RAT PORTAGE, ONT.—A plan has been submitted to the Town Council, by T. R. Deacon, for a proposed steel bridge over the first outlet; estimated cost, $22,000.

READING, PA.—A bridge proposed at Spring street between Sixth and Eighth street will be a through Pratt truss highway bridge on masonry foundation, with 330 ft. steel approach, to have two 164-ft. spans and 30-ft. roadway and two 6-ft. sidewalks.

REGINA, N. W. T.—J. S. Dennis, Deputy Commissioner of Public Works, is receiving tenders for a bridge across Fish Creek.

SENECA FALLS, N. Y.—A bridge 335 ft. long at Rumsey street is reported under consideration.

SPRINGFIELD, MO.—The city will shortly issue $37,000 of bonds for viaducts and subways. G. W. Harkney, City Clerk.

ST. THOMAS, ONT.—The city has asked the Legislature for authority to issue debentures for $20,000 for rebuilding Wilson's bridge with an iron structure, without submitting the question to the ratepayers.

TERRE HAUTE, IND.—The Vigo County Commissioners have voted to build a steel wagon bridge over the Wabash River at a cost of $40,000.

TIMBERVILLE, VA.—Several spans of the Southern Ry. bridge at Timberville were washed away, March 10, by high water in the Shenandoah River.

TOPEKA, KAN.—The County Commissioners have located the North Topeka bridge across the Kansas River at the foot of Fairchild street. It will be 900 ft. long and 18 ft. wide. There is yet another bridge across the Kansas River to be located. P. L. Wise, City Engineer.

TORONTO, ONT.—Jas. McDougall, C. E., County Engineer, is preparing plans for a steel bridge over the Humber River at the site of the Eagle bridge, in the village of Weston, County of York.

WAUKESHA, WIS.—Bids are wanted, March 30, according to report, for a steel bridge 144 ft. long over Fox River. Fred A. Gasper, City Clerk.

WIARTON, ONT.—The contract will not be awarded for some time for the steel bridge over Pike River on the town line.

### Other Structures.

AUSTIN, TEX.—Under the bill passed recently by the Texas Legislature, the Houston & Texas is required to build a new passenger station in Austin.

DES MOINES, IOWA.—It is reported that Frost & Granger, architects, of Chicago, Ill., have made plans for a passenger depot for the Chicago & Northwestern in Des Moines, to cost $100,000.

EAST CARNEGIE, PA.—The Columbia Bridge Co., of Pittsburgh, will remove its works from Edinburg, near New Castle, to East Carnegie. The company will erect a steel building 100 x 320 ft.

GUAYMAS, MEX.—New docks are to be built at this place, the terminus of the Sonora R. R. (Southern Pacific Co.).

NEWARK, N. J.—The Lackawanna R. R. has plans for a new station in Newark in connection with the proposed elevation of tracks.

New stations will be built at Maplewood and at Grove street, East Orange.

NEW YORK, N. Y.—Plans are being made in the Engineer's office of the Rapid Transit Commission for the stations on the line of the Rapid Transit R. R.

Bids are wanted, until April 11, by the Park Board at its office at 64th street and Fifth avenue, for contract No. 3 for building the New York Public Library building at 42d street and Fifth avenue.

NORWALK, OHIO.—The Norwalk Iron & Steel Co. wants bids for its new steel plant. The main building will be 120 x 600 ft., and it will contain a 16-in. roll train, heating furnaces, etc. Bids will soon be wanted for the rolling mill machinery, power plant, etc.

ROSARIO, ARGENTINE.—The Argentine Government has authorized the Buenos Ayres & Rosario Ry., and the Central Argentine Ry., to build a union passenger depot and a freight station. It is to be of steel, covered with corrugated iron. An electric plant will also be built.

ST. JOSEPH, MICH.—The union passenger station will be rebuilt during the summer.

ST. LOUIS, MO.—Fire on the afternoon of March 18 destroyed the repair shop of the American Car & Foundry Co.

SOUTH OMAHA, NEB.—In connection with remodeling the yard of the Fremont, Elkhorn & Missouri Valley in South Omaha, we are told that the work includes a new 12-stall engine house in place of the present 4-stall house. The water tank will be removed and a new coaling station built.

WILMINGTON, DEL.—The Philadelphia & Reading will build a new station at the foot of King street. It will be two stories high and 300 ft. long.

## MEETINGS AND ANNOUNCEMENTS.

*(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xii.)*

### New York Railroad Club.

At a meeting of the club held the evening of the 21st the papers presented were "Compressed Air in Railroad Service," by Mr. W. P. Pressinger, and "Railroad Uses of Pneumatic Tools," by Mr. Thomas Aldcorn.

### American Society of Civil Engineers.

At the meeting of March 20 the paper on "Heavy Railroad Construction in Wyoming," by Mr. Boggs, was presented for discussion. This was printed in the February issue of the *Proceedings* of the Society and by abstract in the *Railroad Gazette* last week.

### Railway Signaling Club.

The next meeting of the Club will be held at the Great Northern Hotel, Chicago, on Tuesday, March 26, at 2:30 p. m. No regular paper will be presented, but members are requested to come prepared to ask any questions in which they are particularly interested, or to explain their own "pet hobbies."

### The Franklin Institute.

On Wednesday, April 10, at 8 p. m., will be held a stated meeting of the Mining and Metallurgical Section. The paper of the evening will be "The Inspection and Testing of Cements," by Mr. Richard L. Humphrey.

On Thursday, April 11, the subject for discussion in the Engineering Section will be "Invention and the Rights of Inventors." (Discussion will be opened by Mr. S. Lloyd Weigand.)

### Association of Railway Telegraph Superintendents.

The twentieth annual meeting of the Association of Railway Telegraph Superintendents will be held at Buffalo, N. Y., June 19, 20 and 21. The Topic Committee consists of J. H. Jacoby, Superintendent of Telegraph, Lehigh Valley R. R., South Bethlehem, Pa.; C. A. Darlton, Superintendent of Telegraph, Southern Ry., Washington, D. C., and U. T. Fry, Superintendent of Telegraph, Chicago, Milwaukee & St. Paul, Milwaukee, Wis. The Committee of Arrangements are: C. A. Smith, F. P. Valentine, S. A. D. Forristall, of Boston; L. B. Foley and L. S. Wells, of New York; J. H. Jacoby, South Bethlehem, Pa., and H. W. Pope, of Buffalo. P. W. Drew, Milwaukee, Wis., is Secretary.

### Engineers' Club of St. Louis.

The 522d meeting was held on March 6 at 8:15 p. m., Vice-president Kinealy presiding. Attendance, 25 members and 9 visitors. The report of the Board of Managers on a plan whereby advertisements for the Journal and Bulletin would be solicited by an agent on commission was adopted, and the club authorized the Board of Managers to put said plan into operation. The subject of the evening was an informal address on "The Development of the Steam Engine," by Prof. J. H. Kinealy. The speaker gave an interesting talk, illustrated by lantern slides. At the next meeting there will be a paper by S. B. Russell on "Bank Revetment Work at the Chain of Rocks Pumping Station," illustrated by lantern slides.

## PERSONAL.

*(For other personal mention see Elections and Appointments.)*

—Mr. R. E. Bakenhus, of Washington, D. C., has been appointed a civil engineer in the U. S. Navy.

—Mr. J. C. Morris was, on March 16, appointed Railroad Commissioner of Ohio. He succeeds Mr. R. S. Kayler.

—Mr. Clinton L. Rossiter, President of the Brooklyn Rapid Transit Company, has resigned. Mr. J. L. Greatsinger, President of the Duluth & Iron Range Railroad, is to take his place. Mr. Rossiter's resignation took effect March 20.

—Capt. William Crozier, Ordnance Department, U. S. A., who was recently appointed by the President and confirmed by the Senate as Professor of Natural and Experimental Philosophy at the Military Academy, West Point, has declined the appointment, preferring to remain in the Ordnance Department.

—Mr. Gilbert Wilkes, the head of a firm of electrical and mechanical engineers, having offices in Detroit, Mich., and Denver, Colo., died in Denver on March 11, aged 38 years. Mr. Wilkes was a graduate of the Naval Academy, and served the Navy for 11 years before resigning to engage in private business.

—Mr. John F. Miller, Vice-President of the Cleveland, Akron & Columbus, has been selected as one of the St. Louis Fair Commissioners by President McKinley, and the official announcement will be made in a few days. Mr. Miller was for many years General Superintendent of the Pennsylvania lines west of Pittsburgh, Southwest System.

—Mr. H. D. Taylor, who will on April 1 assume the duties of Superintendent of Motive Power of the Lehigh Valley, was formerly Master Mechanic of the Wilkesbarre shops. He left this company to go with the Calumet & Hecla Mining Company. Mr. Taylor's headquarters will be at South Bethlehem, Pa.

—Mr. C. N. Comstock, for many years Paymaster of the Illinois Central, died in Chicago March 11. Mr. Comstock had been in the railroad service about half a century and had been employed on the Illinois Central for 47 years. He was a conductor on the New York & New Haven before going West, in 1856. His term as Paymaster on the Illinois Central ended in 1882, since which time he has held a position in the Treasurer's department.

—Mr. Hersey B. Goodwin, a member of the Massachusetts State Railroad Commission for the last four years, has resigned his position on account of ill health. Coincidently with the announcement of the resignation the Governor announced that he had appointed to the vacancy Mr. Clinton D. White. Mr. White has been for several years a member of the Harbor and Land Commission, where he has made a record for public spirit and efficiency.

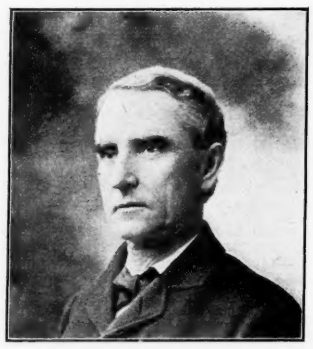
—Mr. Edward H. Gilman, Manager and Treasurer of the Laconia Car Works, died at his home in Exeter, N. H., March 19, at the age of 45 years. Colonel Gilman's connection with the Laconia works brought him in close relations with many railroad officers in New England. He was also prominent in New Hampshire politics, and on several occasions declined the nomination for Governor of that State. Colonel Gilman served in the New Hampshire House in 1884 and in the Senate in 1889, and was a member of Governor Busiel's council and of Governor Sawyer's staff.

—English papers announce that the General Managership of the Midland Railway, to be vacated by Mr. Turner, is to be filled by the appointment of Mr. J. Mathieson, who is now Commissioner of the Government Railroads in Victoria, Australia. It is said that the new Manager will not come to England until May. Mr. Mathieson is about 50 years old, and was born in Scotland. He served on the Glasgow & South Western as clerk and station master until 1885, when he was appointed Superintendent. He went to Queensland as Government Railroad Commissioner in 1889, and from there to Victoria in 1896.

—Mr. Charles H. Duell, Commissioner of Patents, resigned on March 15, to take effect on the appointment of his successor. Mr. Duell resigns to resume the practice of law. He will open an office in New York city, and will have associated with him Mr. W. A. Megrath, who has been for many years law clerk to the Commissioner of Patents, and Mr. F. A. Warfield, an examiner in the Patent Office. Mr. Duell was appointed about three years ago, when about 15,000 patent applications were awaiting action, but by securing from Congress an increase in force, and introducing many improvements and labor-saving devices, the work was brought up to date and a new division of classification established which is now reclassifying 700,000 United States and over 1,000,000 foreign patents.

—Mr. David S. Gray, who has for several years been General Agent of the Pennsylvania Lines at Columbus, Ohio, has retired from the service under the age limit of the pension rules. Mr. Gray was born in Sussex County, Del., in 1829, and began his railroad career as a clerk on the Cleveland, Columbus & Cincinnati in 1850. He held various positions on the Central Ohio and other lines until 1864, when he organized the operating department of the Star Union Line, and was for many years its manager. In 1869 he became Second Vice-President of the Pittsburgh, Cincinnati, Chicago & St. Louis, returning to the Union Line in 1872. Mr. Gray has been General Agent at Columbus since 1887, and for two years (1896-7) he was one of the Board of Managers of the Joint Traffic Association.

—Mr. Joseph H. McConnell, Superintendent of Motive Power and Machinery, has resigned from the Union Pacific Railroad, and will be succeeded April 1 by Mr. Samuel Higgins, who is now Superintendent of Motive Power of the Lehigh Valley Railroad. Born Sept. 29, 1843.



at Elmira, N. Y., Mr. McConnell began his railroad work in 1861 as a machinist's apprentice on the Great Western Railroad, now the Wabash, at Springfield, Ill. Later he was a machinist for four years, which were divided between the Chicago, Burlington & Quincy and the Chicago & Alton railroads. In 1868 he became General Foreman of the Union Pacific shops at Omaha, and held that position until 1872. From 1872 to 1885 he was Division Master Mechanic of the Union Pacific at North Platte, Neb., and from 1885 to 1886 was Master Mechanic of the Nebraska Division. When the cloudburst of revision struck the Union Pacific in 1886 Mr. McConnell, with many other active members of the road's working forces, was temporarily swept into retirement. Two years, 1886 to 1888, were then given to mercantile pursuits by Mr. McConnell at Omaha. With the accession of Mr. S. H. H. Clark to the Presidency of the system Mr. McConnell returned to the Union Pacific, and for something over two years was engaged in the reorganization of the motive power department and other special work. In February, 1891, he was appointed Superintendent of Motive Power and Machinery of the system, and has continued in that position to the present time.

Mr. McConnell has been a member of the American Railway Master Mechanics' Association since 1891, and was President of the Association during the year 1899-1900. In 1891 he also joined the Master Car Builders' Association, of which he is now a representative and executive member. In the work of both associations he is recognized as a valuable committeeman and execu-

tive, and withal has a discriminating sense of humor that has told for good on many occasions. While we are not informed as to Mr. McConnell's further plans, to express the hope that his severance of relations with the Union Pacific may in no way affect his active relations with the two great railroad associations is to express the feeling of all others of their members. The *Railroad Gazette* extends its best wishes for his further success in whatever field he may select.

## ELECTIONS AND APPOINTMENTS.

*Bay Shore Terminal.*—The officers of this company are: H. L. Page, President; H. L. Smith, Vice-President, and A. E. Krise, Treasurer. The Directors, including the above-mentioned, are: T. H. Synon, S. Q. Collins, Thomas H. Willcox, C. A. Woodard, Frank W. Darling, T. C. White, M. W. Burke, Wm. M. Rettew, B. W. Leigh, J. E. Cole and George L. Neville. (See Railroad Construction column.)

*Blue Ridge & Atlantic.*—The Directors of this company are: George L. Prentiss, H. S. Prentiss, Frank Presbrey, of New York; Edwin Brobston, Brunswick, Ga., and F. S. Johnston, Franklin, N. C. Mr. G. L. Prentiss is President. (See Construction Supplement, March 8, 1901.)

*Central of Georgia.*—W. H. Prendergast has been appointed Master Mechanic at Columbus. Ga.

*Cleveland, Cincinnati, Chicago & St. Louis.*—J. W. Cowper, Engineer Maintenance of Way at Mattoon, Ill., has resigned.

*Georgetown & Western.*—The officers of this company are: F. S. Farr, President; L. R. Freeman, Vice-President; E. B. Freeman, General Manager; Frederick Stewart, Treasurer; Henry Pierce, Secretary, and E. L. Lloyd, Auditor.

*Gulf, Beaumont & Kansas City.*—R. E. Maher, Car Service Agent of this company, and Superintendent of Terminals of the Beaumont Wharf & Terminal, having resigned, these offices have been abolished. Reports of car mileage and all correspondence relative thereto should hereafter be addressed to W. E. Maxson, Superintendent.

*Gulf, Colorado & Santa Fe.*—The headquarters of W. B. Scott have been removed from Temple to Brenham, Texas.

*Lehigh Valley.*—H. D. Taylor has been appointed Superintendent of Motive Power, with headquarters at S. Bethlehem, Pa., succeeding S. Higgins, resigned, effective April 1.

*Marietta, Columbus & Cleveland.*—H. A. Clare, Vice-President, has been appointed General Manager, succeeding R. H. England. D. B. Cunningham becomes General Superintendent.

*Mexican National.*—H. M. Taylor, heretofore Trainmaster, has been appointed Superintendent at San Luis Potosi, Mex., succeeding A. Clark, who, in turn, becomes Superintendent at Mexico, Mex., succeeding the late V. R. Dwinell.

*Nevada-California-Oregon.*—R. M. Hall has been appointed Chief Engineer, with headquarters at Reno, Nev.

*New York Central & Hudson River.*—Samuel Watson has been appointed Master Mechanic of the Middle Division, with headquarters at West Albany, effective March 16.

*North Arkansas & Western.*—The officers of this company are: President, H. W. Seaman; Vice-President, E. E. Hughes, and Secretary and Treasurer, A. M. Cooper (See Railroad Construction column.)

*Pennsylvania Company.*—H. W. Thornton, heretofore Engineer Maintenance of Way, has been appointed Superintendent of the Marietta Division (Northwest System), succeeding L. Ohliger, transferred. C. H. Walton, Superintendent of the Chicago Terminal Division (Northwest System), having been granted leave of absence, the duties of that office will, until further notice, be discharged by C. S. Sims, as Acting Superintendent, effective March 20.

*Peoria & Pekin Union.*—At a meeting, held March 12, J. A. Barnard was elected President and E. N. Armstrong, Vice-President.

*Quebec Southern*—P. L. Raymond has been appointed Superintendent of Motive Power, with headquarters at St. Hyacinthe, Quebec.

*Rio Grande, Sierra Madre & Pacific.*—E. D. Morgan has been elected Vice-President and Treasurer.

*St. Louis Southwestern.*—W. Lander has been appointed Assistant Master Mechanic, with headquarters at Pine Bluff, Ark., succeeding C. J. Langston.

*Tennessee Coal, Iron & Railroad.*—At a meeting, held March 12, D. H. Bacon, G. McCoy and E. Graves were elected Directors.

*Toledo, St. Louis & Western.*—We stated last week that J. S. Turner had resigned as Superintendent of Motive Power and Equipment. We are officially informed that up to March 17 his resignation had not been offered.

*Youghiogheny Central.*—P. J. Rainey has been appointed General Freight Agent, with headquarters at Cleveland Ohio.

## RAILROAD CONSTRUCTION.

### New Incorporations, Surveys, Etc.

ALABAMA ROADS.—G. H. Benner, of Courtland, is reported interested in a project to build a road from Courtland to Lamb's Ferry, on the Tennessee River.

ALLEGHENY & CHESAPEAKE.—This company has been organized to build a line from Davis, W. Va., on the West Virginia Central & Pittsburgh, southeast to the Virginia boundary line, about 50 miles. Wm. E. Stokes, of Philadelphia, is interested.

ALPENA & WESTERN.—This company has been incorporated in Michigan to build a road from Alpena to the village of Bellaire or some other point on the shores of Lake Michigan. The capital stock is $1,000,000, and the principal stockholders are William N. Marr, Thomas N. Goodburne, Delbert C. Morris, Elijah J. Tuttle, William C. Heath and James M. Goodell, of Detroit; James H. Tolfee, of Toledo, G. M. Babcock, of Atlanta, Mich., and Robert Rea, of Hillman, Mich.

BATON ROUGE & MOBILE.—This company is being formed by Hon. A. R. Hart, Mayor of Baton Rouge, La., to build from Baton Rouge across the State of Mississippi to Mobile, Ala., in all about 175 miles.

BAY SHORE TERMINAL.—According to report, contracts for building this road will be given out in about a week. The officers are given under Elections and Appointments.

BOSTON & MAINE.—Surveys are being made in the town of Holden, Mass., for a re-location on account of abolishing the Dawson crossing.

BRITISH COLUMBIA ROADS.—Robert Wood and J. Kerr, of Greenwood, B. C., are applying to the Provincial Legislature for charter for a railroad from either Midway or Rock Creek to Vernon, which is to pass up the west fork of Kettle River. A preliminary survey is reported being made.

BRUNSWICK & BIRMINGHAM.—The Brunswick (Ga.) Dock & Improvement Co. announces that plans have been made for the development of that property, which includes an extension of the B. & B. along the water front. The railroad company is given a water frontage of 100 acres for a terminal.

CARO & LAKE HURON.—This company was incorporated in Michigan with a capital stock of $200,000 to build a railroad from Caro, Tuscola County, to Owendale, Huron County, a distance of about 17 miles. The Directors are: Henry B. Joy, Gilbert W. Lee, C. E. Lothrop, W. C. McMillan, T. H. Newberry and M. L. Williams, of Detroit, and Charles Montague, of Caro, Mich. It is understood that this line is in the interest of a beet sugar factory at Caro, and is intended to extend through a good beet country.

CADIZ.—This company was incorporated in Kentucky, March 12, to build between Cadiz and Hopkinsville, about 10 miles. The following are officers and directors: W. C. White, President; D. L. Grinter, Vice-President; Judge John D. Shaw, Secretary; B. Armitage, General Manager; J. W. Crenshaw, K. R. McKee and George L. Smith, all of Cadiz, Ky., except B. Armitage, who is from Pennsylvania. (Feb. 22, p. 135.)

CANADIAN PACIFIC.—Improvements estimated to cost about $120,000 will be made on the line between Toronto and Owen Sound.

The Company has an application before the Dominion Government for a charter for the Crows Nest Ry., to build a spur line south to the United States boundary line.

CHARLESTON, CLENDENNIN & SUTTON.—Arrangements have been completed, according to report, for finishing this road to Sutton, W. Va.

CHICAGO, BURLINGTON & QUINCY.—The company is preparing to build two cut-offs on the Keokuk & Western division from Des Moines to Leon, Iowa. One will be from St. Marys to New Virginia in Warren County, about six miles. The other will be from Bethany, in Decatur County, about 12 miles.

Capitalists of Ottumwa, Iowa, are reported negotiating with the C., B. & Q., for six miles of old main track between Ottumwa and Agency, both in Wapello County, Iowa, to be used as a part of an electric interurban line.

CHICAGO, MILWAUKEE & ST. PAUL.—Maps have been filed for the approval of an extension to Quinnesec, Dickinson County, to reach some important mining industries and will probably lead to the opening of some new mines.

The company is preparing to build an extension from Davenport, the southern terminus of the Davenport & Northwestern Division, southwest about 110 miles to Ottumwa, Iowa, on the Kansas City Division. Surveys are being made from Columbus Junction, in Louisa County, to Ottumwa, 58 miles. This section will be built first owing to the difficulties to be encountered from Davenport to Columbus Junction.

In addition to the extension of its Des Moines-Boone Division from a point northwest of Boone to Lehigh, Webster County, Iowa, 22 miles, the company is considering plans for an extension from Des Moines south to Chillicothe, Mo., on the Kansas City Division, the latter extension to be 100 miles long.

COLUMBIA, HUNTSVILLE & NORTHWESTERN.—This company was chartered in Missouri, March 10, with a capital of $1,200,000, to build a railroad 120 miles long between Columbia and Trenton, Mo. The promoters and principal stockholders are C. H. Hammett, W. W. Knight, J. W. Creech, all of Kansas City, Mo.

COPPER RANGE.—Maps have been filed with the Michigan Railroad Commission for a proposed extension in Ontonagon County to reach important mining locations.

CORNWALL & WESTERN.—This company was recently incorporated in Pennsylvania with a capital stock of $250,000, by B. H. Buckingham, of Cornwall, Pa., Edward C. Freeman, R. Percy Alden, Cornwall; A. M. Patch, Lebanon; J. H. Moore, Pittsburgh. The road is proposed from Cornwall to Steelton, Dauphin County.

CORSICANA & SABINE PASS.—This company has surveyed part of the right of way. The road is proposed between Fort Worth and Sabine Pass, about 300 miles. Hon. B. B. Paddock, of Fort Worth, Tex., is interested.

CRAWFORD COUNTY STREET.—It is stated that Pittsburgh capitalists have organized this company to build an electric railroad connecting with existing lines and making a through system between Oil City and Erie, Pa.

DALTON & BLUE RIDGE.—This company has been incorporated to build a 56-mile road between the places named. M. S. Squires and E. H. Carver are interested.

DENVER & RIO GRANDE.—The company is building a branch road from Texas Creek station, on the Leadville branch on the Arkansas River, south 30 miles to West Cliff. The grading is finished and track is laid to within two miles of West Cliff. The road will probably be opened for traffic May 1. The West Cliff branch to Canon City was originally built through Grape Creek Canon in 1882, but was washed out three times and then abandoned in 1886. The Texas Creek branch, now building, is a renewal of the old Grape Creek track. This extension will probably be extended 28 miles further south to Gardner, Huerfano County; then 26 miles further south to Walsenburg, Huerfano County, where the Southern Colorado coal mines are located.

DES MOINES, IOWA FALLS & NORTHERN.—This company has made an agreement with the Illinois Central for terminal facilities at Iowa Falls.

DURHAM.—This company is reported incorporated to build from the mines at Durham, Ga., five miles to a connection with the Alabama Great Southern. Address C. E. James, of Chattanooga, Tenn.

DUBUQUE & TOLEDO.—A new survey for this proposed line will soon be made from Dubuque to Toledo, 104 miles.

EAST JERSEY RAILROAD & TERMINAL.—This company filed articles of incorporation in New Jersey, on Jan. 13, with a capital of $25,000. The road to be built is from a point in Bayonne to the Kill von Kull, upon the property of the Tidewater Oil Co., a distance of about two miles.

EMPORIA & GULF.—An extension is reported proposed to connect with the Southern Pacific near Rockland, Tex.

ERIE EASTERN.—A committee, representing the Erie Eastern, is said to be ready to let a contract to build this road to Mill Village, where it will connect with the Erie R. R., a distance of 27 miles.

FLORIDA ROADS.—J. E. Starke, of Fernandina, late General Auditor of the Jacksonville, Tampa & Key West, with others, has applied for charters in the states of Georgia and Florida to build a standard gage road from Jesup via St. Marys and Yulee to Jacksonville, a distance of about 100 miles. It is said that he has secured the right of way of the old Southeastern Georgia & Florida. The proposed line will need drawbridges at the Saltilla and St. Marys Rivers. Nassau River and Trout Creek will also be bridged.

FORT WORTH & DENVER CITY.—According to the annual report, an inspection of bridges is being made, and when this is finished a statement will be made showing the necessities of the road for bridge renewals, protection of banks, ballasting, etc., and for rebuilding of shops at Fort Worth.

FORT WORTH & RIO GRANDE.—See Railroad News column.

GEORGIA PINE.—A contract is let to J. H. Davidson & Co., of Thomasville, to build a 30-mile extension from Bainbridge. The road is completed to Tallahassee.

GIRARD, THORNHILL & HAZELTON BELT LINE.—This company was incorporated in Ohio, March 13, with a capital of $10,000, to build a railroad connecting Girard with Hazelton. The incorporators are: Chas. W. French, Thomas W. Sanderson, H. K. Wick and Hugh B. Wick. See also Manufacturers' Belt Line; also Girard & Lowellville Belt Line.

GIRARD & LOWELLVILLE BELT LINE.—This company was incorporated in Ohio, March 13, to build a road connecting Girard and Lowellville. See Girard, Thornhill & Hazelton; also Manufacturers' Belt Line.

GREAT NORTHERN.—It is reported that a line will be built into Republic via Kettle Falls, following the Columbia River from the end of the Spokane Falls & Northern, about four miles south of Myers Falls. The survey made about 10 years ago will be used.

Extensive improvements are contemplated in Washington during the coming season. Chief Engineer Stevens is reported as saying that something will be done during the summer to relieve the road of landslides which have occurred during the past two years on the Coast line between Everett and Seattle. The main line will be widened and reballasted from Spokane to the Cascades. The company will continue its policy of replacing wooden trestles and bridges with steel structures.

HOUSTON EAST & WEST TEXAS.—A 10-mile extension is under consideration from Tenaha, Tex., to Center.

HUTCHINSON & SOUTHEASTERN.—This company was incorporated in Kansas, March 13, to build a railroad from Hutchinson, Kan., to Fort Smith, Ark. The incorporators are: Frank L. Martin, W. E. Burns and E. M. Holbrook, of Hutchinson; A. D. Bennett, of Port Huron, Mich.; Henry T. Thurber, of Detroit, Mich., and Charles A. Denneen and E. D. Harrington, of New York. The authorized capital is $500,000.

INDIANA, ILLINOIS & IOWA.—Maps have been filed for the approval of the Board of Railroad Crossings, showing a proposed one-mile extension from St. Joseph to Benton Harbor, Berrien County.

JACKSONVILLE, ST. MARYS & JESUP.—See Florida Roads.

JANESVILLE, BELOIT & DELEVAN LAKE.—This company was recently incorporated in Wisconsin, to build an electric road between Janesville and Rockford, to be used for both passenger and freight service. The capital stock is $100,000. H. H. Clough, of Elyria, Ohio, is interested.

KANSAS, EASTERN OKLAHOMA & TEXAS.—The taxpayers of Cherryvale, Kan., have offered to give $20,000 to this company to build through Cherryvale.

KANSAS ROADS.—A franchise has been granted by the Montgomery County Commissioners to I. B. Wallace, George T. Burnsey and T. H. Stanford, for an electric railroad from Independence to Cherryville, Kan. The company has not been chartered, as stated in this column, March 1, p. 152.

KINGSTON & CENTRAL MISSISSIPPI.—An officer is reported as stating that about 15 miles of road will be opened by Sept. 1. The road will probably be extended later north to Memphis, Tenn., and south to Merrill, Miss.

MANUFACTURERS' BELT LINE.—This company was incorporated in Ohio, to build a belt line around the city of Youngstown, Ohio, connecting Lowellville, in Mahoning County, with Girard, in Trumbull County. The capital is $10,000, to be increased later, and the incorporators are: George Tod, Edward L. Tod, Hugh B. Wick, Joseph G. Butler, Jr., and Thomas G. Wells, of Youngstown. See also Girard, Thornhill & Hazelton Belt Line.

MARQUETTE & SOUTHEASTERN.—Maps have been filed with the Michigan Railroad Commission, showing a change in the proposed line in the City of Marquette, and an extension of the line to a connection with the Munising Ry.

MOBILE & WEST ALABAMA.—Surveys and estimates have been made and considerable right of way secured for this road, which is proposed from Florence, Ala., to Mobile, with a branch to Birmingham. Congress has authorized bridges over navigable rivers. It is proposed to have a deep water terminus at Dauphin Island. H. Austill, of Mobile, is President.

NEW ORLEANS, NATCHEZ & ARKANSAS.—A. T. Averill, of Cedar Rapids, Iowa, is President of this company, which proposes to build a railroad 100 miles long from Vidalia to Lake Providence.

NEW YORK & QUEENS COUNTY.—This company proposes to build its electric railroad on Jackson avenue, Long Island City, this spring.

NEW YORK CENTRAL & HUDSON RIVER.—The company proposes to make extensive improvements to the yard at DeWitt this year, increasing the yard capacity 50 per

cent. Work will be begun as soon as the weather will permit.

Work will soon be begun on eliminating the 14 grade crossings in the vicinity of Syracuse. About a mile of new track will be laid west of the village of Solvay.

North Arkansas & Western.—H. W. Seaman, of Clinton, Iowa, heretofore Vice-President, informs us that the North Arkansas & Western Ry., originally projected by W. A. Bright, has been bought by himself and others, and it is proposed to change the name to the Ozark & Cherokee Central Ry. The contract has been let to the Kenefick Construction Co., to build 42 miles from Fayetteville to a connection with the Kansas City, Pittsburgh & Gulf, at Westville, and the road will be built to Tahlequah, Ind. T., as soon as practicable. The primary object of the present owners is to develop the tie and timber business along the line. There is a large amount of white oak tie and saw timber tributary to it. The officers of the N. A. & W. are given under Elections and Appointments.

Northern Pacific.—An officer writes that the company will make large expenditures this season in renewing rail, ballasting, reducing grades, building new bridges and in furnishing general structures and other facilities for the improvement of its line, but no details are available.

Regarding the report published last week that the company proposes to build an extension from Oberon, N. Dak., we are told that no such extension is authorized.

Oneonta, Cooperstown & Richfield Springs.—This company has filed a certificate with the Secretary of State showing a proposed extension from Cooperstown to Oneonta, N. Y.

Orange & Northwestern.—Final surveys are reported made and it is said contracts will be let soon. J. W. Maxcey, Engineer, Houston, Texas.

Oregon Short Line.—An officer writes that it is not definitely decided to build a line in the Salmon River country in Idaho, but that the matter will probably be determined soon. It will be about 90 miles long, running northwest from Blackfoot.

Ozark & Cherokee Central.—See North Arkansas & Western.

Pennsylvania Company.—The company is reported considering absorbing the Toledo, Peoria & Western and rebuilding the road. A bill has been introduced in the Legislature to allow the company to take over the T., P. & W.

Pittsburgh & Lake Erie.—It is reported that officers of this company recently visited New Castle to consider enlarging the terminals at that place.

St. Louis & San Francisco.—Contract has been let to C. J. Lantry, of Kansas City, for ballasting between St. Louis and Sherman, the Texas terminal. Work has progressed as far as Sapulpa, Ind. T., 100 miles.

The company expects to build an extension from Sherman, south, and, according to a statement by President Yoakum, the company wants to reach Fort Worth from the north, at the Stock Yards, via the Texas & Pacific trestle and the Fort Worth & Rio Grande track.

An officer writes that it is the intention of the Kansas City, Fort Scott & Memphis to build immediately, in connection with the St. L. & S. F., a line southwest from Miami, Ind. T., at the most feasible point, which has not yet been determined. (March 15, p. 194.)

Sabine Pass & Northwestern.—An officer writes that contracts will be let as soon as securities are sold for this road, which is proposed from Sabine Pass, via Denison to coal fields in Indian Territory, a total distance of 411 miles. The Consulting Engineer made surveys and reported on the whole project in 1900, which is to cost about $20,000 per mile, to be raised by first mortgage 5 per cent. gold bonds. Fifty-nine miles have been graded. The work will not be difficult, being about 6,000 yds. of material to as low as 3,000 yds. per mile. There will be no bridges of consequence. The heaviest grade will be 1 per cent.

Southern Pacific.—President Charles M. Hays, in an interview, is reported as stating that the Governor of Sonora, Mex., wants the Southern Pacific to build an extension southwest to Mazatlan, an important Pacific port of Mexico, so that the road may be used as a military railroad by the Mexican Government. The company is figuring on a branch line 127 miles long in Sonora to tap valuable coal fields.

Springfield, Jefferson City & Chicago.—This company, which was incorporated in February, 1900, to build between Springfield and Jefferson City, about 200 miles, is considering an extension from Jefferson City into Arkansas, about 75 miles. Wm. Woodburn, of Des Moines, Iowa, and J. E. Fulkerson, of Lebanon, Mo., are interested.

Tallahassee Southeastern.—It is said that the new owners of this road have decided to finish the line to the Suwanee River by June 1. R. L. Bennett, of Tallahassee, Fla., represents the promoters.

Tellico R. R. in Tennessee.—The Smoky Mountain Land, Lumber & Improvement Co. is reported organized to buy this road and extend it from Athens north to Rockwood, about 30 miles. W. L. Haskell, of Philadelphia,

Tennessee Central.—Contract has been let to the Carnegie Steel Co. for rails for the 30-mile extension between Lebanon and Nashville. A contract for building this section will soon be let.

Texas & Pacific.—An officer writes that an extension will be built from New Roads, La., northeast along the west bank of the Mississippi River, and that the line is now located from New Roads to the mouth of Red River, and the grading is contracted for with Grigsby Bros. Construction Co. The rest of the work will probably be done by the company's own force. A bill has recently passed Congress authorizing the T. & P. to bridge the Red River, but the exact location has not been decided upon. A party of engineers is in the field north of Red River in the direction of Vidalia, in Concordia County, La. The intention is to continue the road and crowd this north through to the Arkansas line, following near the bank of the Mississippi River for the entire distance. From New Roads to Vidalia the road will be about 90 miles.

Texas Shore Line.—Work will soon be begun on this road from Grand Saline, 10 miles, to a connection with the Missouri, Kansas & Texas. H. M. Strong, President; R. S. Weitzell, of Weatherford, Tex., is Chief Engineer.

Timpson Northwestern.—This company was incorporated in Texas, March 12, to build a road about eight miles long between Timpson, Shelby County, and Panola, in Panola County. The incorporators are W. G. Ragley, M. J. Ragley, R. W. Wright and others, of Winsboro, Sulphur Springs and Greenville.

Toledo & Chicago.—This company was incorporated in Ohio, March 15, to build a railroad for the Wabash R. R. from Montpelier, Ohio, to Toledo, making a through road from Toledo to Chicago. The capital stock is $250,000, and the incorporators are: B. C. Winston, of New York, and F. J. Reynolds, Geo. H. Beckwith, C. H. Newton and C. L. Reynolds, of Toledo. See also Wabash. Pa., is interested.

Vicksburg, Canton & Birmingham.—Surveys have been made for this road, which will be about 227 miles long. D. Levy, at Canton, Miss., is Secretary.

Wabash.—Work was begun, on March 11, on the new road to connect Chicago and Toledo, which is expected to be finished by Jan. 1 next. See Toledo & Chicago.

Washington & Oregon.—In the Superior Court at Vancouver, Wash., Judge Miller decided against the Columbia Valley R. R. in its intervention proceedings of the Washington & Oregon R. R. to condemn the right of way of the Portland & Puget Sound R. R., between Vancouver and Lewis River. The Washington & Oregon now has possession of the right of way.

Wheeling & Elm Grove.—This electric railroad proposes to extend to West Alexander.

Yorktown, Poquoson & Hampton.—A director of this company is reported as saying that surveys will soon be begun for this road which is proposed between Yorktown and Hampton through Poquoson. (Construction Supplement, March 8, 1901.)

## GENERAL RAILROAD NEWS.

Baltimore & Ohio.—The report that the Pennsylvania has secured full control of the B. & O. is denied by Vice-President Green, of the Pennsylvania, who is reported as saying:

Our present arrangements with the Baltimore & Ohio are very satisfactory. We are not seeking control and do not want it. There will be no increase in our representation in the board, which is now confined to Mr. Prevost and myself. As to Mr. Solomon's retiring from the Chairmanship of the Executive Committee, we have heard nothing, but it would not be surprising if he should resign at the end of the present year. He assumed the position with the understanding that it would be temporary.

Boston & Maine.—The company has bought, through the Old Colony Trust Co., of Boston, the preferred and common stock of the Central Massachusetts R. R., at $65 and $21 respectively. New stock is offered to shareholders until April 15. The lease of the Central Massachusetts to the B. & M. will soon expire.

Buffalo & Susquehanna.—The company has arranged to create $3,500,000 first mortgage refunding 4 per cent. gold bonds, due 1951, of which $1,000,000 will be reserved to retire the remaining bonds of the original $2,000,000 loan. Fisk & Robinson, of New York, are receiving advance subscriptions for the new bonds at par and interest, with ½ per cent. discount for advance subscriptions.

Burlington, Cedar Rapids & Northern.—On March 5, the company came into full possession of the South St. Paul Belt Ry., which will be used for access to the St. Paul Union Depot. The acquired company owns 3.58 miles and operates in all 5.9 miles of track. The B., C. R. & N. is in operation to Owatonna and work is in progress to Faribault, 50 miles, from St. Paul. The new directors of the Belt Line are given under Elections and Appointments.

Chattanooga, Rome & Southern.—A meeting of the stockholders will be held on May 15 to consider the sale of the property to the Central of Georgia Ry.

Chicago & Western Indiana.—First mortgage bonds of 1879 to the amount of $108,000 have been drawn and will be redeemed, May 1, at 105, at the office of J. P. Morgan & Co., New York.

Chicago Great Western.—The C. G. W. has bought from J. J. Hill all the outstanding stock and bonds of the Mason City & Fort Dodge, and the road will be held as a proprietary line of the C. G. W., and not incorporated into the system. The purchase includes the coal fields near Fort Dodge owned by the Webster County Coal Co. The M. C. & Ft. D. extends from Mason City to near Fort Dodge, about 90 miles, and was built some years ago by Mr. Hill. There are $1,380,000 bonds outstanding, and $900,000 of stock.

Cincinnati Connecting Belt.—The stockholders, at the annual meeting, March 14, voted to call and pay off the $200,000 outstanding bonds.

A joint meeting of the stockholders of the Cincinnati, Portsmouth & Virginia road will be held, April 9, to perfect plans for buying the Cincinnati Connecting Belt Road, preparatory to merging both properties in the Norfolk & Western.

Denver & Rio Grande.—See Rio Grande Western.

Erie.—J. P. Morgan & Co. are offering at 94 and interest, $32,000,000 of the Erie's Pennsylvania Coal collateral 4 per cent. 50-year gold bonds, bearing interest from April 1, 1901. These bonds are to provide for part of the cost of acquiring the capital stock of the Pennsylvania Coal Co., the Erie & Wyoming Valley R. R., and the Delaware Valley & Kingston R. R.

Fort Worth & Rio Grande.—Negotiations are pending for the acquisition of this property by the St. Louis & San Francisco. H. B. Hollins & Co. are reported to have sold a majority of the stock at private sale at $30 a share, and have arranged with the other holders for disposing of their stock at the same price, provided it is delivered at their office on or before March 27. If the sale is made, the Fort Worth & Rio Grande will be extended from Brownwood, Texas, its present southern terminus, about 225 miles southwest to the Mexican border.

Great Northern.—A circular announcing the terms of an issue of $25,000,000 of new stock was issued March 18. The increase is for the purpose of acquiring additional lines that will add more than 500 miles to the roads controlled by the company; and to acquire a control of the ships of the Great Northern Steamship Co., of which two are now building at New London, Conn. Since the Great Northern took possession of the St. Paul, Mineapolis & Manitoba, it has paid out of its revenues $5,000,000 for permanent additions. It is now proposed to cancel this obligation by crediting on the new subscription $20 per share, which will aggregate $5,000,000, and which shall be a release of the obligations due to the St. P., M. & M. Holders are entitled to subscribe for $25 of new stock for each share of their holdings, to be made in five payments, the first on May 27.

Kansas City, Fort Scott & Memphis.—At the annual meeting of the Current River R. R., it was announced that an arrangement had been made whereby one share of the common stock of the K. C., F. S. & M. will be given by the Old Colony Trust Co. for six shares of the stock of the Current River, upon presentation of the stock before April 15, in Boston, Mass.

Chas. Merriman, Treasurer of the Kansas City, Memphis & Birmingham, will receive proposals, until March 30, for the sale, at not exceeding 110 and accrued interest, of 17 first mortgage bonds of the K. C., M. & B. of the issue of March 1, 1887, being all the outstanding bonds of that issue. (March 8, p. 178.)

Mason City & Fort Dodge.—See Chicago Great Western.

Mexican National.—It is announced that Speyer & Co. have bought the holdings of stock and bonds of the Mexican National, owned by the Mexican National Construction Co.

New Orleans & Carrollton.—A meeting will be held, on April 8, to consider increasing the capital stock from $1,200,000 to $1,400,000.

New York, Ontario & Western.—The company has made an equipment trust for $750,000, securing 4½ per cent. $1,000 notes, bearing date March 1, 1901, one-tenth of the total to be payable at the end of each six months after March 1 at the office of the Manhattan Trust Co. The trust covers the following equipment: Five hundred and seventy-five standard coal cars, 85,000 lbs. capacity, from American Car & Foundry Co.; 25 pressed steel cars, 85,000 lbs. capacity, from Pressed Steel Car Co.; 25 rolled beam steel coal cars, 85,000 lbs. capacity, from Sterlingworth Ry. Sup. Co.; six vestibule coaches and two drawing-room cars six 100-ton consolidation and one mogul locomotive.

Norfolk & Western.—See Cincinnati Connecting Belt.

Ohio Southern.—Holders of certificates of the Central Trust Co., New York, issued on deposit of the first mortgage 6 per cent. gold bonds under the agreement of June 21, 1896, are notified that upon presentation at the office of the Central Trust Co., New York, and assent to the plan and agreement of Feb. 20, 1901, they will be entitled to receive $191.55 on each certificate. (March 1, p. 152.)

Philadelphia & Reading.—The Atlantic City R. R. has bought a majority of the common and preferred stock of the Seacoast Ry., which extends from Winslow Junction, N. J., to Cape May, and from Sea Island City to Ocean City, nearly 77 miles. The road was heretofore leased to the Atlantic City.

Rio Grande Western.—Regarding the negotiations toward a consolidation, President General W. J. Palmer has issued a statement saying, in part: The Denver & Rio Grande and Rio Grande Western, originally (in 1881) in one interest, have recently been engaged in negotiations having for their sole object the bringing of these two lines together again. These negotiations have been solely between the companies named. The Union Pacific or the Southern Pacific (Harriman syndicate) has nothing to do with them, although George Gould, or the Missouri Pacific, is understood to have acquired a large interest in the shares of the Denver & Rio Grande. The result of the negotiations between the Rio Grande Western and the Denver & Rio Grande is not likely to be determined for two or three months.

Salem.—At the foreclosure sale, on March 1, this road extending from Salem, Ohio, to Washingtonville, 6.92 miles, was bid in at $125,000, for the Morton Trust Co., of New York, the mortgage trustee. (Jan. 25, p. 70.)

Seaboard Air Line.—Negotiations are pending for an issue of $10,000,000 5 per cent. 10-year collateral trust refunding gold bonds, to be secured by a deposit with the New York Trust Co. of $20,000,000 Seaboard Air Line Ry. first mortgage 4s. The collateral trust bonds will be redeemable at any time at the pleasure of the company at 105 and accrued interest. The $10,000,000 will be used as follows:

To fund $3,400,000 six per cent. certificates due March, 1902, to be called in immediately; to provide for the payment of $2,000,000 collateral trust 5s, due October, 1902; to pay for one-sixth interest in the proprietary company controlling the road from Richmond, Va., to Washington, D. C.; to reimburse the railway for the amount paid to T. F. Ryan for his majority stocks; the retirement of maturing car trusts; the extinguishment of floating indebtedness incurred for improvements; to provide for future betterments, improvements, etc.

It is understood that the general office will be removed to Richmond, Va., by July 1.

Southern.—The Blue Grass Rapid Transit Co., of Lexington, Ky., has made a proposition to the Southern Ry. for a lease of a branch line connecting Georgetown, Versailles and Midway, Ky., to be used as an interurban electric railroad.

Tennesse Central.—The Secretary of the Cumberland Plateau R. R. announces a meeting of the stockholders, May 6, at Crossville, Tenn., to authorize the lease of the property of the Cumberland Plateau to the Tennessee Central; also to approve an issue of bonds.

Texas & Pacific.—The Avoyelles Ry. has been bought by the Texas & Pacific, for $425,000, and it is reported that an extension will be made. The total track is 42 miles.

Unadilla Valley.—This company has filed a mortgage with the Central Trust Co., of New York, on its 20.93 miles of road, running from Bridgewater, Oneida County, to New Berlin, Chenango County, N. Y.

Wabash.—At a special meeting of the stockholders and debenture bondholders, held in St. Louis, March 19, several propositions for extensions of the system and buying of new rolling stock were agreed to. An issue of $3,000,000 of bonds for building and equipping the new line between Toledo and Montpelier, and also for a line from Fort Wayne to Butler, Ind., was authorized. To buy new rolling stock or to extinguish the rolling stock obligations of the company an issue of $3,000,000 bonds was authorized, to be known as rolling stock or equipment bonds. It was also voted to acquire the property and capital stock of the Kansas City, Excelsior Springs & Northern R. R. in Missouri. (Feb. 1, p. 88.)